RECOMMENDATIONS OF THE COMMISSION ON THE LIMITS OF THE CONTINENTAL SHELF IN REGARD TO THE PARTIAL SUBMISSION MADE BY IRELAND ON 25 MAY 2005 ON THE PROPOSED OUTER LIMIT OF ITS CONTINENTAL SHELF BEYOND 200 NAUTICAL MILES IN THE AREA ABUTTING THE PORCUPINE ABYSSAL PLAIN.

Recommendations prepared by the Subcommission established
by the Commission on the Limits of the Continental Shelf
to consider the partial submission made by Ireland

Adopted by the Subcommission on 7 September 2006 and transmitted
to the Commission on the Limits of the Continental Shelf for consideration and adoption

Adopted by the Commission on 5 April 2007

New York, 2007

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I. Introduction

1. Ireland made a Submission to the Commission on the Limits of the Continental Shelf (hereinafter "the Commission"), through the Secretary-General of the United Nations (hereinafter "the Secretary-General"), on 25 May 2005. This Submission was made pursuant to the provisions contained in article 76, paragraph 8, and Article 4 of Annex II to the 1982 United Nations Convention on the Law of the Sea (hereinafter "the Convention").

2. This was the first partial Submission made to the Commission. It covers one of the areas where Ireland intends to establish, in accordance with article 76, the outer limits of its continental shelf beyond 200 nautical miles (hereinafter "M") from the baselines from which the breadth of the territorial sea is measured (hereinafter referred to as "the extended continental shelf"), namely the area abutting the Porcupine Abyssal Plain. The Submission contains particulars of such limits along with the supporting scientific and technical data.

3. A submitting State has the responsibility, under article 4 of Annex II to the Convention, to give the names of any Commission members who have provided it with scientific and technical advice. As stated in the Submission, Ireland was assisted in the preparation of the Submission by Mr. Peter F. Croker, member of the Commission (1997-present). No advice was provided by any other member of the Commission.

4. The Commission received, through the Secretary-General, two notes verbales containing comments from other States regarding the data reflected in the executive summary of the partial Submission made by Ireland, including all charts and coordinates as made public by the Secretary-General in accordance with rule 50 of the rules of procedure of the Commission (hereinafter "the rules of procedure" – CLCS/40). The two notes verbales were sent, respectively, by Denmark on 19 August 2005 and Iceland on 24 August 2005. These notes were examined and the contents noted by the Commission, as appropriate. Both States indicated that the Submission made by Ireland and any recommendations by the Commission are without prejudice to any future Submissions made by them (see Annex IV).

5. The Commission makes these Recommendations to Ireland in fulfilment of its mandate established in article 76, paragraph 8, and articles 3 and 5 of Annex II to the Convention and in accordance with article 76.

6. The Commission prepared these Recommendations following the internal procedures and the methodology outlined in Article 5 of Annex II to the Convention, and in the following official documents of the Commission:

   - Rules of procedure (CLCS/40);

   - Scientific and Technical Guidelines (CLCS/11, CLCS/11/Corr.1, CLCS/11/Corr.2, CLCS/11/Add.1, CLCS/11/Add.1/Corr.1 – hereinafter "the Guidelines").

7. The Commission makes its Recommendations recognising the fact that the outer limits of the continental shelf as established by a coastal State on the basis of its Recommendations shall be final and binding according to article 76, paragraph 8, of the Convention.

II. The Submission of Ireland and its consideration by the Commission and the Subcommission

8. The Submission was received by the Secretary-General on 25 May 2005. On the same date, the Secretary-General gave due publicity to the executive summary of the Submission in accordance with rule 50 of the rules of procedure. The consideration of the Submission made by Ireland was included in the agenda of the sixteenth session of the Commission, in conformity with rule 51 of the rules of procedure.

A. Contents of the Submission

1. Original Submission

9. The original Partial Submission, received on 25 May 2005, consisted of three parts: Part I - executive summary; Part II - Geology and Geomorphology of Ireland and its Continental Shelf; Part III - Delineation of the Continental Shelf and relevant annexes and appendices in hard and digital copies. The list of the materials included in the Submission received on 25 May 2005 is contained in Annex I (1) to these Recommendations.

2. Additional materials

10. In the course of the examination of the Submission by the Subcommission, Ireland submitted additional materials on:

i. 25 July 2005;
ii. 30 August 2005;
iii. 1 September 2005;
iv. 7 September 2005;
v. 8 September 2005;
vi. 9 September 2005;
vii. 11 November 2005 (materials dated 4 November 2005);
viii. 23 January 2006 (materials dated 17 January 2006);
ix. 25 January 2006;
x. 26 January 2006;
xi. 10 April 2006;
xii. 12 April 2006;
xiii. 19 April 2006;
xiv. 27 July 2006;
xv. 25 August 2006;
xvi. 28 August 2006,

11. The list of additional materials submitted by Ireland is contained in Annex I (2-18) to these Recommendations.

B. Consideration of the Submission

12. Pursuant to paragraph 2 of Annex III of the rules of procedure, the Delegation of Ireland made a presentation of the Submission to the Commission, during its sixteenth session, on 30 August 2005. In accordance with article 5 of Annex II to

the Convention, the Commission decided to consider the Submission by way of a Subcommission composed of seven members, appointed in a balanced manner taking into account the specific elements of the Submission.

13. For this purpose, on the same date, the Commission established a Subcommission for the examination of the Submission. In accordance with article 5 of Annex II to the Convention and rule 42, paragraph 1(a) of the rules of procedure, the Commission identified and deemed ineligible to be a member of the Subcommission one member who is a national of the coastal State making the Submission was and who had assisted it by providing scientific and technical advice with respect to the delineation. No member of the Commission was identified as one who could be perceived, in accordance with rule 42, paragraph 1(b) of the rule of procedure, to have a conflict of interest regarding the Submission. The Commission established the Subcommission composed of the following seven members Hilal Mohamed Sultan Al-Azri, Indurlall Fagoonee, Noel Newton St. Claver Francis (Vice Chair), Mihai Silviu German, Abu Bakar Jaafar (Chairman), Yuri Borisovitch Kazmin (Vice Chair) and Philip Alexander Symonds. The Commission also appointed a member of the Commission, Fernando Manuel Maia Pimentel as an expert in hydrography and geomorphometrics.

14. The Subcommission established at the sixteenth session of the Commission examined the Submission during the sixteenth, resumed sixteenth, seventeenth and eighteenth sessions. In the course of the examination, the Subcommission held a total of 42 meetings, including 8 meetings with the Delegation of Ireland, in the course of the sixteenth, resumed sixteenth, seventeenth and eighteenth sessions. It posed a total of 25 written questions (see Annex II) to the Irish Delegation, and the Delegation provided responses in writing (see Annex III).

15. Pursuant to rule 52, paragraph 3, of the rules of procedure, the Subcommission made its presentation to the Delegation of Ireland, on its preliminary conclusions of the examination of the Submission, on 19 April 2006, during the seventeenth session of the Commission.

16. The Subcommission adopted these Recommendations on 7 September 2006, during the eighteenth session of the Commission, and submitted them to the Chairman of the Commission on the same date.

C. Statement of Understanding by the Subcommission on the Submission by Ireland

17. Upon commencing its consideration of the Submission, the Subcommission became aware that the Submission contained some information that was not directly related to the present Submission, which deals only with the outer limits of the continental shelf in the area abutting the Porcupine Abyssal Plain. This information covered the area from foot of the continental slope (hereinafter "FOS") profile 46 to FOS profile 60.

18. The Subcommission notified Ireland that the fact that these data and information, not relating to the area under consideration, were included in the Irish partial Submission and made available to the Subcommission, should not be interpreted in any way as implying that the Subcommission approves or disapproves any potential maritime claims to which this data and information may or may not apply. This is

consistent with paragraph 1 of Annex I to the rules of procedure, according to which:

> *"The Commission recognises that the competence with respect to matters regarding disputes which may arise in connection with the establishment of the outer limits of the continental shelf rests with States."*

19. The Subcommission, however, gave its full attention and due consideration to all data and information relevant and applicable to the present partial Submission.

D. Matters related to unresolved disputes

20. The partial Submission is made by Ireland in respect of the area abutting the Porcupine Abyssal Plain, in accordance with paragraph 3 of Annex I to the rules of procedure, in order not to prejudice unresolved questions relating to the delimitation of boundaries between Ireland and some of its neighbours in other portions of the extended continental shelf claimed by Ireland. Submissions in respect of these other portions of extended continental shelf will be made by Ireland at a later stage.

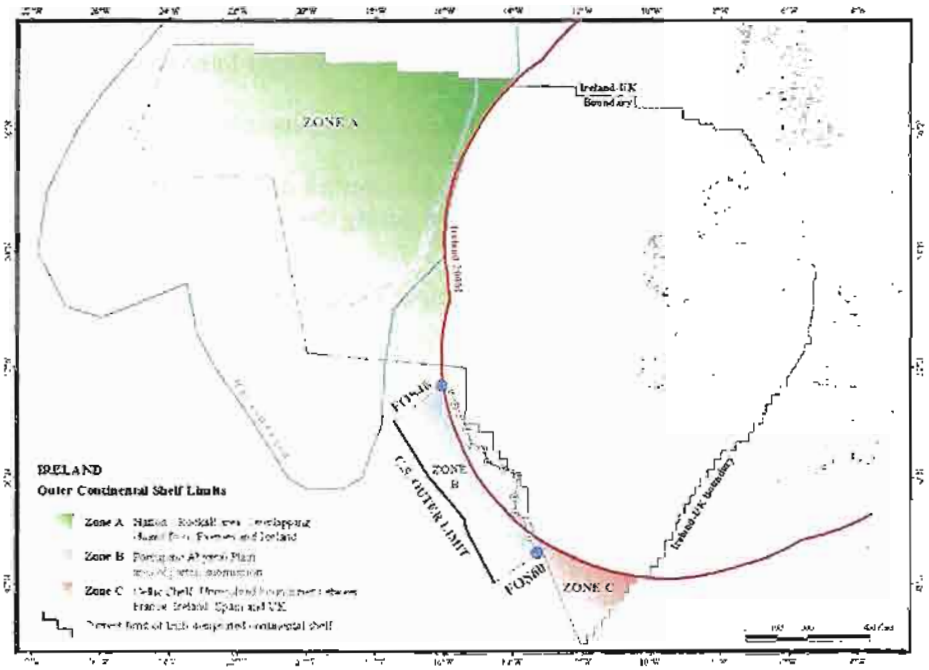
21. The issue of overlapping claims and unresolved maritime boundaries is dealt with in the executive summary of the partial Submission of Ireland.

22. Unresolved boundaries between France, Ireland, Spain and the United Kingdom of Great Britain and Northern Ireland exist in the Celtic Shelf region, which borders Ireland's partial Submission to the southeast.

23. Ireland has overlapping claims with Denmark/The Faroe Islands and Iceland for the continental shelf in the Hatton-Rockall area to the northwest of the area of the present partial Submission.

24. According to the map presented in the executive summary as Figure 1.3 (reproduced as Figure 1), the partial Submission of Ireland is made in respect of the area, which is located outside the areas of overlapping claims from Denmark/The Faroe Islands and Iceland, and outside the area with unresolved boundaries between France, Ireland, Spain and the United Kingdom of Great Britain and Northern Ireland.

Figure 1



25. The two notes verbales received by the Commission reflect the views of the Government of Iceland and of the Government of Denmark with regard to the partial Submission of Ireland.

26. It is the view of the Government of Iceland that the Submission made by Ireland and any recommendations by the Commission are without prejudice to any future Submission made by Iceland with respect to the continental shelf in the Hatton-Rockall area and to the delimitation of the continental shelf in the area between Iceland and Ireland.

27. The Government of Denmark has taken the position that the Submission made by Ireland and the Commission's recommendations are without prejudice to any future Submission made by Denmark or to the delimitation of the continental shelf in the Hatton-Rockall area between Denmark/The Faroe Islands and Ireland.

28. The Commission confirms that these Recommendations are without prejudice to any future Submission made by any State with respect to the extended continental shelf and to the question of delimitation of the continental shelf between States with opposite or adjacent coasts.

E. Examination of the Submission

1. Examination of the format and completeness of the Submission

29. Pursuant to paragraph 3 of Annex III to the rules of procedure, the Subcommission examined and verified that the format of the Submission was in compliance with the requirements set out in paragraph 1 of Annex III to the rules of procedure, and ensured that all necessary information was included in the submission.

2. Preliminary analysis of the Submission

30. Pursuant to paragraph 5 of Annex III to the rules of procedure, the Subcommission undertook a preliminary analysis of the Submission, in accordance with article 76 of the Convention and the Guidelines and concluded as follows:

(i) The outer edge of the continental margin as defined by both the 1 per cent sediment thickness and FOS + 60 M formulae lies beyond 200 M, and therefore the test of appurtenance was satisfied by Ireland;

(ii) The outer limit of Ireland's extended continental shelf in the area abutting the Porcupine Abyssal Plain consists of a combination of a 1 per cent sediment thickness point and FOS + 60 M points;

(iii) The construction of the outer limits contains straight lines not longer than 60 M;

(iv) The advice of an expert in hydrography and geomorphometrics should be sought from a member of the Commission;

(v) Additional time would be required to review all data and to prepare the recommendations to the Commission during the following sessions of the Commission.

3. Main scientific and technical examination of the submission

31. The Subcommission gave due consideration to the Submission through the procedure provided for in paragraph 9 of Annex III to the rules of procedure incorporating the following processes:

(i) Further examination of the data and information supporting every point of the FOS, selected for the delineation of the proposed outer limits;

(ii) Raising questions on points for response by the Delegation of Ireland, and continuing to examine parts of the Submission and requesting further clarifications by the Delegation;

(iii) Requesting technical support from the GIS staff of DOALOS;

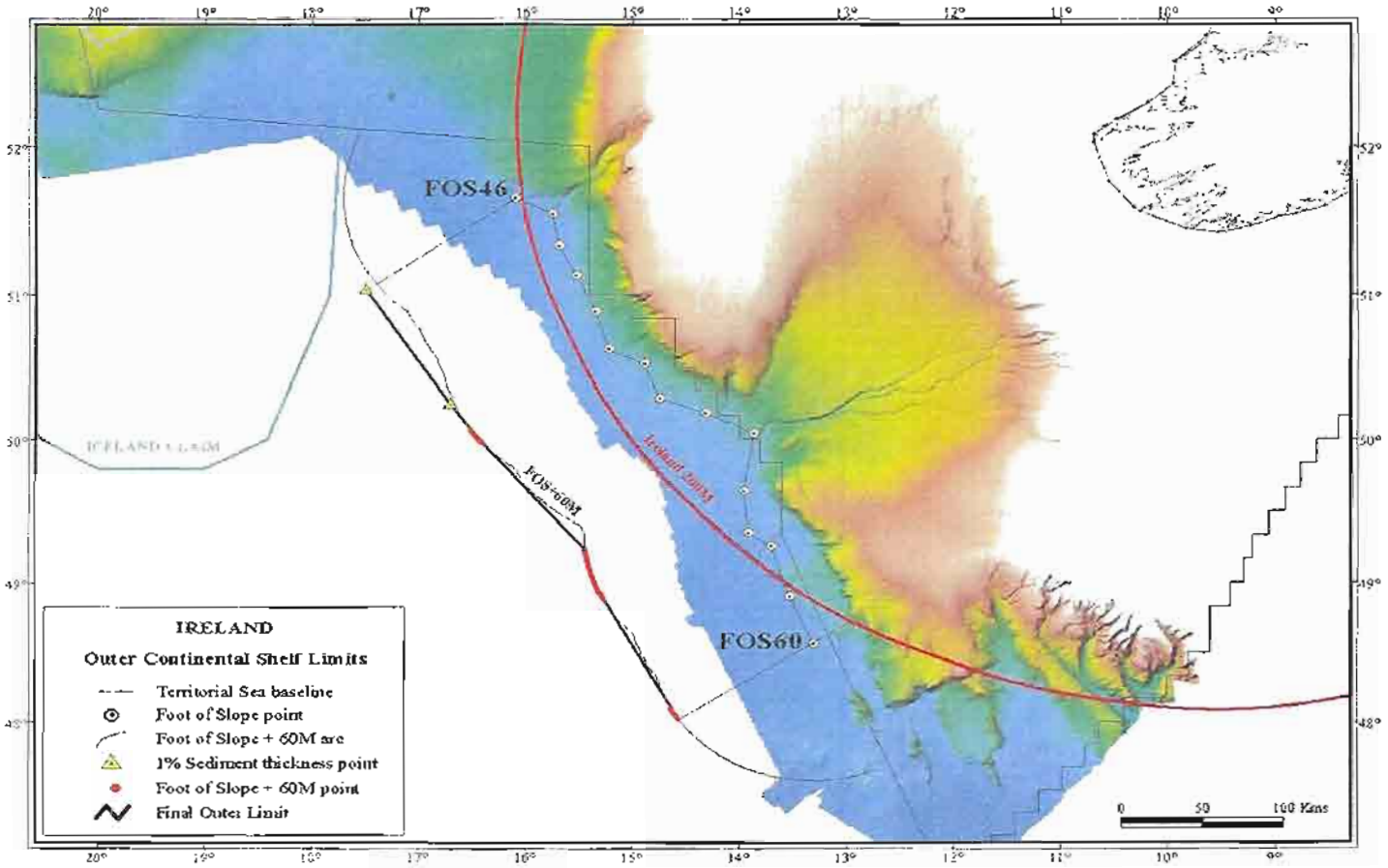
(iv) Construction of the 3D images using a the Triangular Irregular Network (TIN) approach based on the data provided by Ireland;

(v) Seeking expert advice on hydrography and geomorphometrics from a member of the Commission; and

(vi) Presenting preliminary conclusions of the examination of the Partial Submission made by Ireland on 19 April 2006.

32. As shown in Figure 2, in the Submission, a total of 39 Fixed Points (hereinafter "FPs") were generated from 5 selected points of the FOS, namely (as Part I, per Appendix 1.1, page 6, of the Executive Summary): FP 1 from FOS 46; FP 2 from FOS 50; FPs 3-10 from FOS 51; FPs 11-32 from FOS 57; and FPs 33-39 from FOS 60. 2 FPs were established by the Gardiner Formula; 37 FPs by the Hedberg Formula;

Figure 2



33. The coordinates of the fixed points, as presented in the original partial Submission, are outlined in Table 1.

Table 1

ID	Latitude (°N)	Longitude (°W)	Method	From ID	To ID	Distance (m)	Distance (M)
1	51.0376718	-17.4926083	1% Sediment Thickness				
2	50.2478896	-16.7035439	1% Sediment Thickness	1	2	104085.29	56.20
3	50.0691902	-16.5126452	FOS + 60 M	2	3	24107.91	13.02
4	50.0554937	-16.4979397	FOS + 60 M	3	4	1851.94	1.00
5	50.0419552	-16.4828907	FOS + 60 M	4	5	1851.88	1.00
6	50.0285778	-16.4675026	FOS + 60 M	5	6	1851.88	1.00
7	50.0153645	-16.4517798	FOS + 60 M	6	7	1851.91	1.00
8	50.0023213	-16.4357247	FOS + 60 M	7	8	1851.84	1.00
9	49.9894483	-16.4193439	FOS + 60 M	8	9	1851.95	1.00
10	49.9767514	-16.4026397	FOS + 60 M	9	10	1851.97	1.00
11	49.2097194	-15.4275948	FOS + 60 M	10	11	110665.59	59.75
12	49.1932741	-15.4236130	FOS + 60 M	11	12	1851.83	1.00
13	49.1768732	-15.4192158	FOS + 60 M	12	13	1851.94	1.00
14	49.1605229	-15.4144053	FOS + 60 M	13	14	1851.90	1.00
15	49.1442276	-15.4091816	FOS + 60 M	14	15	1851.88	1.00
16	49.1279917	-15.4035514	FOS + 60 M	15	16	1851.78	1.00
17	49.1118183	-15.3975125	FOS + 60 M	16	17	1851.91	1.00
18	49.0957133	-15.3910671	FOS + 60 M	17	18	1851.87	1.00
19	49.0796798	-15.3842174	FOS + 60 M	18	19	1851.97	1.00
20	49.0637237	-15.3769680	FOS + 60 M	19	20	1851.86	1.00
21	49.0478481	-15.3693211	FOS + 60 M	20	21	1851.90	1.00
22	49.0320589	-15.3612745	FOS + 60 M	21	22	1851.86	1.00
23	49.0163592	-15.3528370	FOS + 60 M	22	23	1851.80	1.00
24	49.0007521	-15.3440066	FOS + 60 M	23	24	1852.00	1.00
25	48.9852450	-15.3347876	FOS + 60 M	24	25	1851.81	1.00
26	48.9698395	-15.3251846	FOS + 60 M	25	26	1851.85	1.00
27	48.9545401	-15.3151976	FOS + 60 M	26	27	1851.94	1.00
28	48.9393514	-15.3048333	FOS + 60 M	27	28	1851.88	1.00
29	48.9242780	-15.2940895	FOS + 60 M	28	29	1851.94	1.00
30	48.9093243	-15.2829750	FOS + 60 M	29	30	1851.78	1.00
31	48.8944919	-15.2714901	FOS + 60 M	30	31	1851.96	1.00
32	48.8797885	-15.2596368	FOS + 60 M	31	32	1851.84	1.00
33	48.0979064	-14.6273868	FOS + 60 M	32	33	98708.61	53.30
34	48.0833284	-14.6153696	FOS + 60 M	33	34	1851.74	1.00
35	48.0688832	-14.6029975	FOS + 60 M	34	35	1851.96	1.00
36	48.0545769	-14.5902751	FOS + 60 M	35	36	1851.94	1.00
37	48.0404143	-14.5772069	FOS + 60 M	36	37	1851.81	1.00
38	48.0263984	-14.5637951	FOS + 60 M	37	38	1851.80	1.00
39	48.0170407	-14.5545155	FOS + 60 M	38	39	1249.70	0.67

a. Foots of the continental slope

34. The points of the FOSs were determined on 2D profiles from a 3D bathymetric grid using CARIS LOTS™.

35. A total of 15 FOSs points were selected, of which 5 of them were used to generate 39 FPs:

46 – used;	**51 – used;**	56;
47;	52;	**57 – used;**
48;	53;	58;
49;	54;	59;
50 – used	55;	**60 – used**

b. Outer limits

36. The outer limits were constructed in CARIS LOTS™ combining the 1 per cent Sediment thickness ("Gardiner") lines and the FOS + 60 M ("Hedberg") lines.

37. Subsequently, in the course of the examination, the Irish Delegation adjusted the proposed limit by introducing a new FP generated from FOS 53. In the view of the Subcommission, this adjustment was of a minor nature and did not require new publicity. The adjustment is illustrated in Table 2.

Table 2: Adjustments made to fixed points in the course of examination of the partial submission

FOS	19 July 2006 confirmed on 27 July [CURRENT Without FPs from FOS 53]			25 May 2005 [ORIGINAL, without FPs from FOS 53]			10 Apr 2006 [With FPs from FOS 53, updated FPs 1-2]			1 Sept 2005 [Manually Generated limits with FPs from FOS 53]		
		Latitude	Longitude		Latitude	Longitude		Latitude	Longitude		Latitude	Longitude
46	FP1	51.0369536	-17.4934128	FP1	51.0376718	-17.4926083	FP1	51.0369536	-17.4934128	FP1	51.0376718	-17.4926083
50	FP2	50.2489863	-16.7005384	FP2	50.2478896	-16.7035439	FP2	50.2489863	-16.7005384	FP2	50.2478896	-16.7035439
51	FP3	50.0691902	-16.5126452	FP3	50.0691902	-16.5126452	FP3	50.0691902	-16.5126452	FP3	50.0691902	-16.5126452
	FP4	50.0554937	-16.4979397	FP4	50.0554937	-16.4979397	FP4	50.0554937	-16.4979397	FP4	50.0554937	-16.4979397
	FP5	50.0419552	-16.4828907	FP5	50.0419552	-16.4828907	FP5	50.0419552	-16.4828907	FP5	50.0419552	-16.4828907
	FP6	50.0285778	-16.4675026	FP6	50.0285778	-16.4675026	FP6	50.0285778	-16.4675026	FP6	50.0285778	-16.4675026
	FP7	50.0153645	-16.4517798	FP7	50.0153645	-16.4517798	FP7	50.0153645	-16.4517798	FP7	50.0153645	-16.4517798
	FP8	50.0023213	-16.4357247	FP8	50.0023213	-16.4357247	FP8	50.0023213	-16.4357247	FP8	50.0023213	-16.4357247
	FP9	49.9894483	-16.4193439	FP9	49.9894483	-16.4193439	FP9	49.9894483	-16.4193439	FP9	49.9894483	-16.4193439
	FP10	49.9767514	-16.4026397	FP10	49.9767514	-16.4026397	FP10	49.9767514	-16.4026397	FP10	49.9767514	-16.4026397
	FP11	49.9642336	-16.3856211				FP11	49.9642336	-16.3856211	FP11	49.9642336	-16.3856211
	FP12	49.9518981	-16.3682904				FP12	49.9518981	-16.3682904	FP12	49.9518981	-16.3682904
	FP13	49.9397464	-16.3506497				FP13	49.9397464	-16.3506497	FP13	49.9397464	-16.3506497
	FP14	49.9277843	-16.3327081				FP14	49.9277843	-16.3327081	FP14	49.9277843	-16.3327081
	FP15	49.9160151	-16.3144701									
	FP16	49.9044388	-16.2959378									
	FP17	49.8930614	-16.2771204									
	FP18	49.8818844	-16.2580199									
	FP19	49.8709124	-16.2386410									
	FP20	49.8601470	-16.2189926									
53							FP15	49.7118147	-16.0163304	FP15	49.7118147	-16.0163304
57	FP21	49.0478481	-15.3693211	FP11	49.2097194	-15.4275948	FP16	48.8652140	-15.2474220	FP16	48.8652140	-15.2474220
	FP22	49.0320589	-15.3612745	FP12	49.1932741	-15.4236130						
	FP23	49.0163592	-15.3528370	FP13	49.1768732	-15.4192158						
	FP24	49.0007521	-15.3440066	FP14	49.1605229	-15.4144053						
	FP25	48.9852450	-15.3347876	FP15	49.1442276	-15.4091816						
	FP26	48.9698395	-15.3251846	FP16	49.1279917	-15.4035514						
	FP27	48.9545401	-15.3151976	FP17	49.1118183	-15.3975125						
	FP28	48.9393514	-15.3048333	FP18	49.0957133	-15.3910671						
	FP29	48.9242780	-15.2940895	FP19	49.0796798	-15.3842174						
	FP30	48.9093243	-15.2829750	FP20	49.0637237	-15.3769680						
	FP31	48.8944919	-15.2714901	FP21	49.0478481	-15.3693211						
	FP32	48.8797885	-15.2596368	FP22	49.0320589	-15.3612745						
				FP23	49.0163592	-15.3528370						
				FP24	49.0007521	-15.3440066						
				FP25	48.9852450	-15.3347876						
				FP26	48.9698395	-15.3251846						
				FP27	48.9545401	-15.3151976						
				FP28	48.9393514	-15.3048333						
				FP29	48.9242780	-15.2940895						
				FP30	48.9093243	-15.2829750						
				FP31	48.8944919	-15.2714901						
				FP32	48.8797885	-15.2596368						
60	FP33	48.0979064	-14.6273868	FP33	48.0979064	-14.6273868	FP17	48.0979064	-14.6273868	FP17	48.0979064	-14.6273868
	FP34	48.0833284	-14.6153696	FP34	48.0833284	-14.6153696	FP18	48.0833284	-14.6153696	FP18	48.0833284	-14.6153696
	FP35	48.0688832	-14.6029975	FP35	48.0688832	-14.6029975	FP19	48.0688832	-14.6029975	FP19	48.0688832	-14.6029975
	FP36	48.0545769	-14.5902751	FP36	48.0545769	-14.5902751	FP20	48.0545769	-14.5902751	FP20	48.0545769	-14.5902751
	FP37	48.0404143	-14.5772069	FP37	48.0404143	-14.5772069	FP21	48.0404143	-14.5772069	FP21	48.0404143	-14.5772069
	FP38	48.0263984	-14.5637951	FP38	48.0263984	-14.5637951	FP22	48.0263984	-14.5637951	FP22	48.0263984	-14.5637951
	FP39	48.0170407	-14.5545155	FP39	48.0170407	-14.5545155	FP23	48.0170407	-14.5545155	FP23	48.0170407	-14.5545155

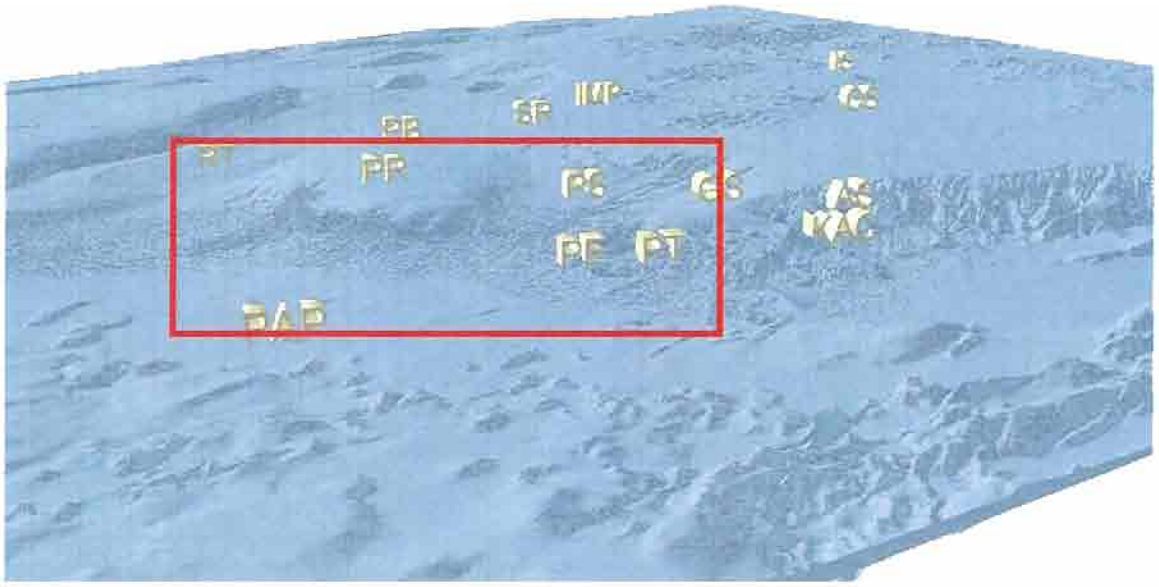
38. The FP 15 generated from FOS 53, proposed during the examination, was not endorsed by the Subcommission on scientific and technical grounds. The Delegation accepted this view.

39. The Subcommission drew the attention of Ireland to discrepancies in the geodetic distances from FOS 46 to the shotpoints in the vicinity of the 1 per cent sediment thickness points. Ireland recalculated the geodetic distance from FOS 46 to shotpoints using the WGS84 geodetic datum for all coordinates. These presented the revised 1 per cent sediment thickness formula table but FP 1 and FP 2 have not changed as a consequence.

4. Analysis of Fixed Points Generated from Selected FOSs

a. Overview

Figure 3: Geomorphological setting of the area abutting the Porcupine Abyssal Plain



[**LEGEND**: AS = Austel Spur; CS = Celtic Sea; GS = Goban Spur; IMP = Irish Mainland Platform; IS = Irish Sea; KAC = King Arthur Canyon; PAP = Porcupine Abyssal Plain; PB = Porcupine Basin; PE = Pendragon Escarpment; PR = Porcupine Ridge; PS = Porcupine Sea; PT = Pendragon Terrace; RT = Rockall Trough; SR = South Rockall]

40. The geomorphological analysis of the Irish continental margin in the partial Submission reveals a two-segment slope. Slope failure/erosion of margin of Porcupine Bank has produced a lower slope composed of coalescing slump, slide and debris flow deposits separated by channels and gulleys. These depositional features are characteristic of slopes and not rises. This is supported by evidence provided by a Subcommission 3D (TIN) Bathymetric Model prepared from multibeam (corrected ping) and other data submitted by Ireland [see Figures 4-6].

Figure 4

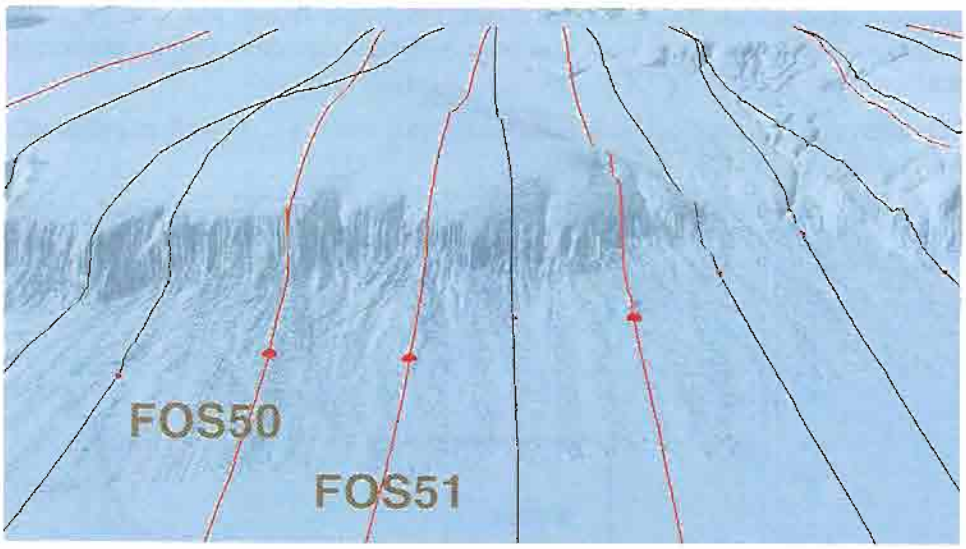
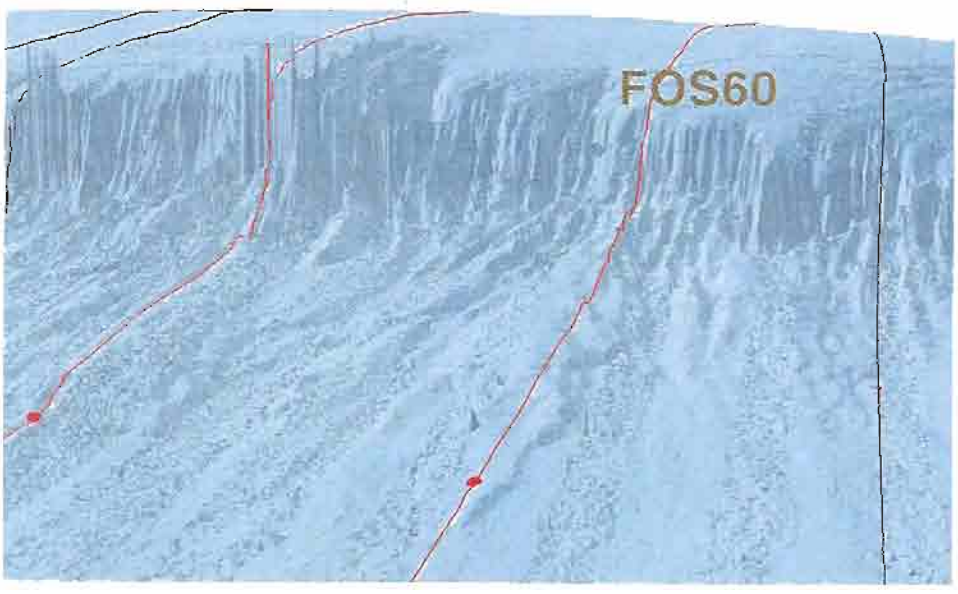


Figure 5

Figure 6



41. The base of the continental slope (hereinafter "BOS") in this part of the Porcupine Bank margin lies at the outer edge of a complex lower slope formed by mass-transport depositional processes associated with slope failure and erosion of the Porcupine Bank margin) and not at a more landward maximum change in regional gradient [see Figure 7].

42. This approach is consistent with paragraphs 5.4.5 and 5.4.6, as well as paragraphs 5.4.12 and 6.3.12 of the Guidelines.

Figure 7

b. Commission's views on the foot of continental slope (FOS) locations

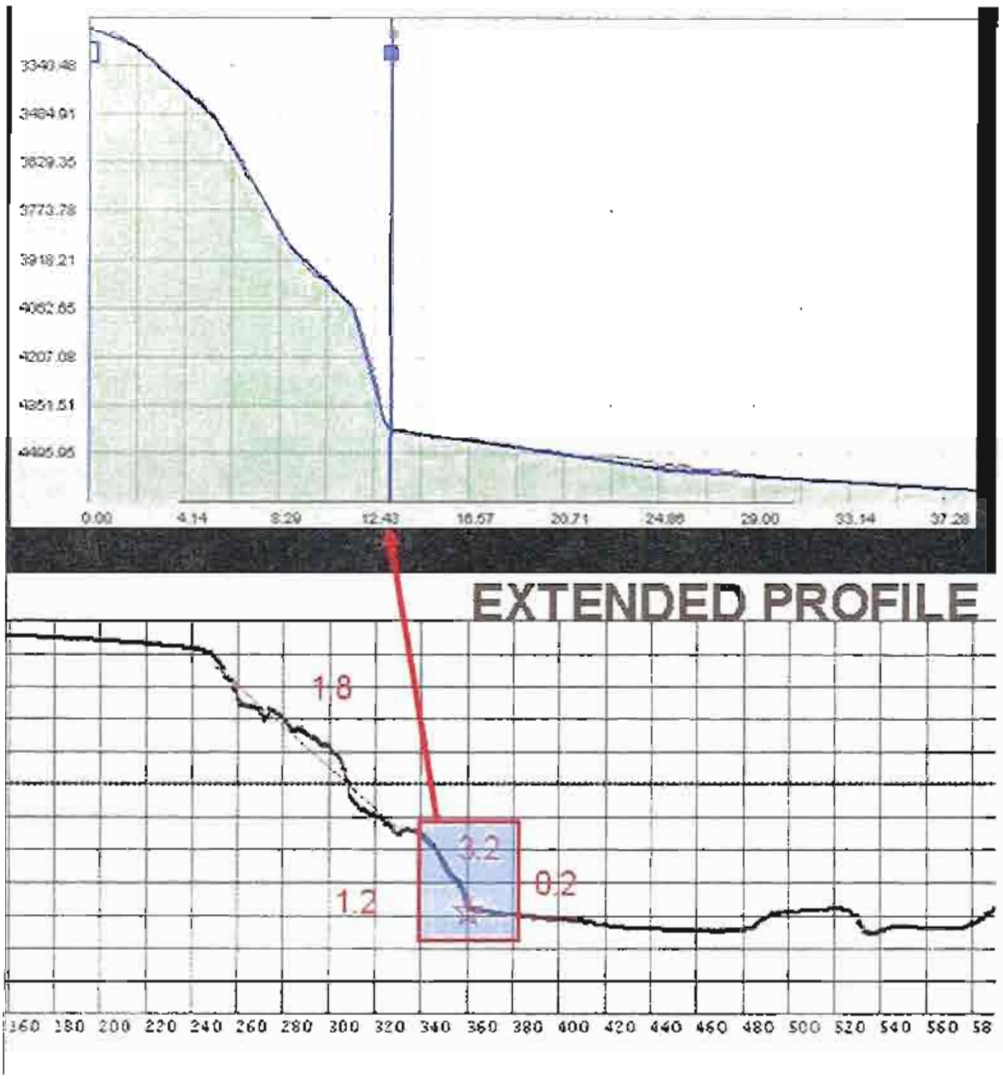
43. It is recommended that the location of FOSs 46, 50, 51, 57 and 60 are acceptable based on the reasoning set out below:

(i) FOS 46

44. FOS 46 is located in the region referred to as the Mouth of the Rockall Trough, which is defined as a two-segment slope area by Ireland. For this FOS, the BOS zone has been defined by Ireland on the basis of geophysics – that is, geophysical data (seismic and potential field data) has been used to assist the morphological determination of the BOS under paragraphs 5.4.5 and 5.4.6 of the Guidelines. The BOS zone appears to straddle the outer edge of the ocean/continent transition in this region.

45. FOS 46 has been established by the criterion of maximum change in the gradient at its base using the Douglas-Peucker Algorithm of CARIS LOTS™, which automatically generated only one potential FOS at this location on the associated bathymetric profile. There is a distinctive regional change in gradient in this area from the lower slope with average gradients of about 2° (varying locally from about 1-8°) to the rise/deep ocean floor with gradients of less than 0.2° [see Figure 8].

Figure 8

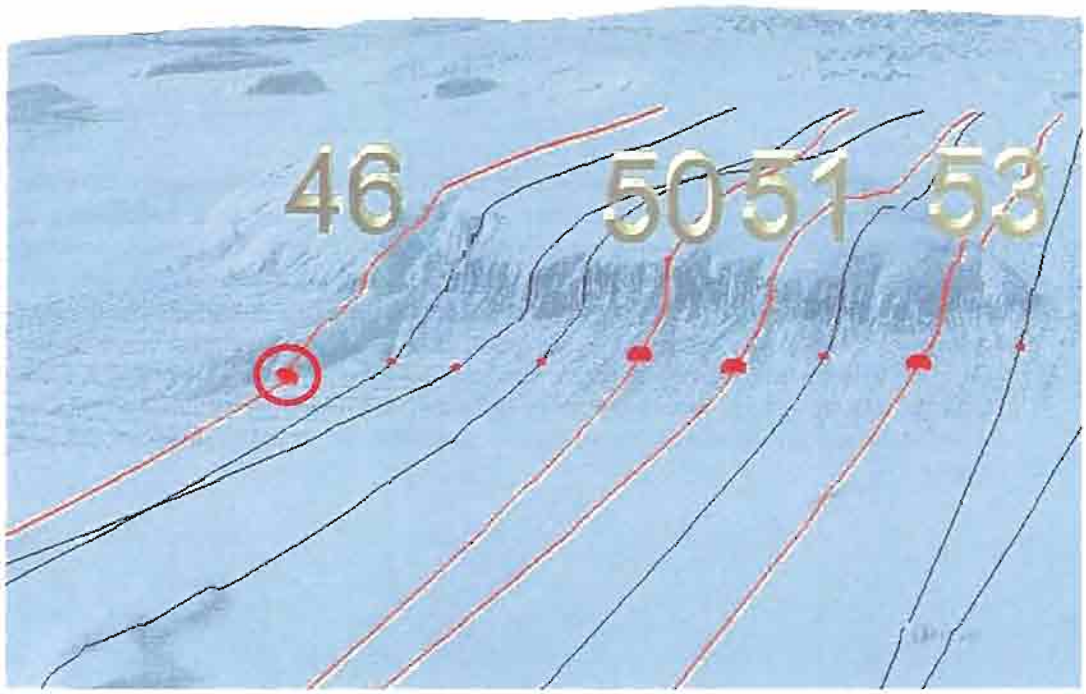


46. The 3D views of the seafloor contained in Figures 9 and 10 below clearly show the two-segment characteristic of the slope in this area involving both the margin of Porcupine Bank and the floor of the Rockall Trough. Figure 9 is a 3D view looking northwest along the Porcupine Bank margin towards the Rockall Trough that was prepared by Ireland from a bathymetric grid incorporating multibeam and other bathymetric data. Figure 10 is a 3D view (TIN) looking northeast towards the Rockall Trough and Porcupine Bank that was prepared by the Commission from multibeam bathymetric (corrected ping) and other data supplied by Ireland. Various FOS locations are shown in these figures and FOS 46 is highlighted by the red circle.

47. The Commission accepts that FOS 46 lies at the BOS and recommends its use in determining outer limit fixed point FP 2 that was established using the 1 per cent sediment thickness formula.

Figure 9

Figure 10

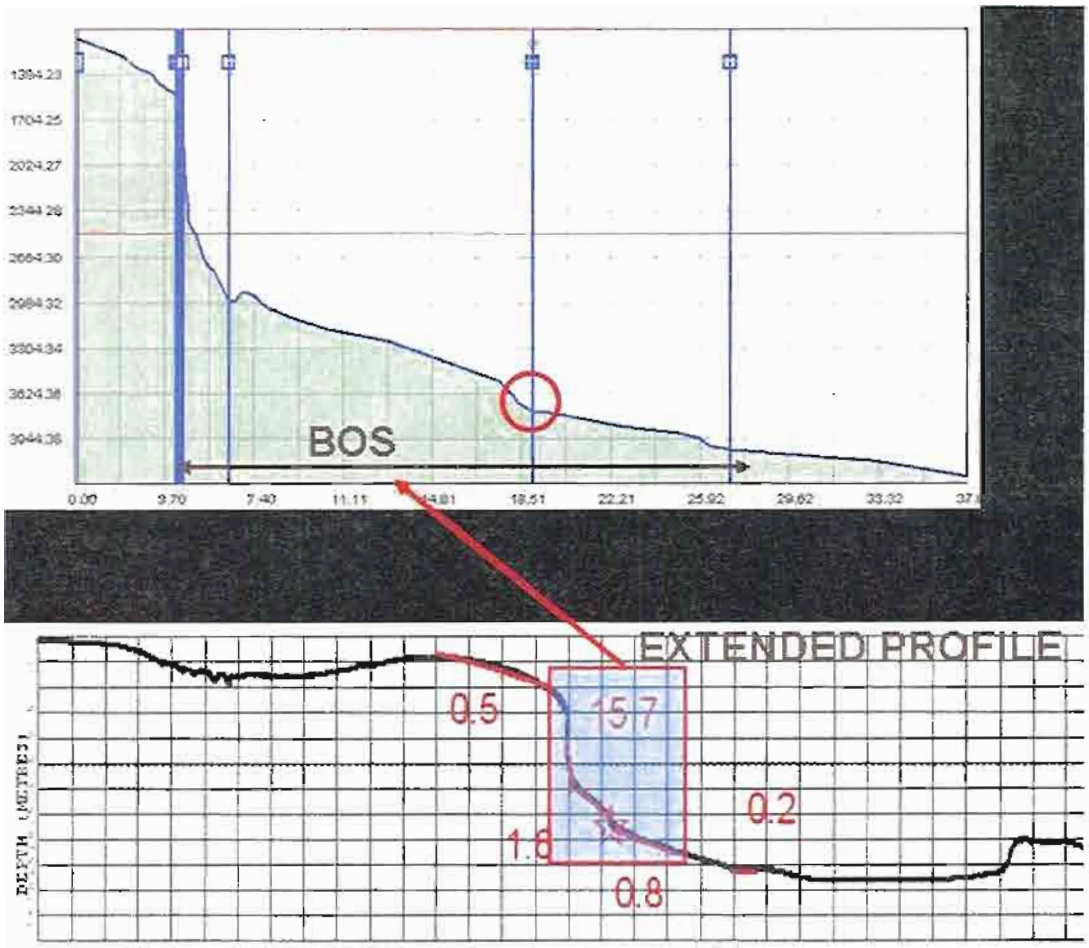


(ii) FOS 50

48. FOS 50 is located in the Porcupine Bank area. The BOS zone is located over the outer part of a two-segment slope defined on the basis of morphology and supported by some geological and geophysical evidence, particularly multibeam bathymetric data. The BOS zone lies at the outer edge of a complex lower slope formed by mass transport deposits resulting from slope failure and erosion of the Porcupine Bank margin [see Figures 11, 12 and 13]. The Commission accepts that these features are characteristic of continental slopes and not continental rises. Regional gradients on this profile are up to 16° on the upper slope, and average about 1.8° (varying locally from 1-6°) on the lower slope, and 0.2-0.8° on the rise [see Figure 11].

49. FOS 50 has been established by the criterion of maximum change in the gradient at its base using the Douglas-Peucker Algorithm of CARIS LOTS™, which automatically generated several potential FOS locations on this profile. The exact FOS location was supplemented by additional evidence, particularly 3D bathymetric images.

Figure 11



50. The 3D views of the seafloor contained in Figures 12 and 13, show the two-segment characteristic of the slope and the complex lower slope formed by mass transport deposits resulting from slope failure and erosion of the Porcupine Bank margin. The Commission recognises these deposits as depositional features of the lower slope. Figures 12 and 13 are 3D views (TINs) looking east and northwest, respectively, along the Porcupine Bank margin. These images were prepared by the Commission from multibeam bathymetric (corrected ping) and other data supplied by Ireland. Various bathymetric profile locations are shown in these figures and FOS 50 is highlighted by the red circle.

51. The Commission accepts that FOS 50 lies at the BOS and recommends its use in determining outer limit FP 2 established using the 1 per cent sediment thickness formula.

Figure 12

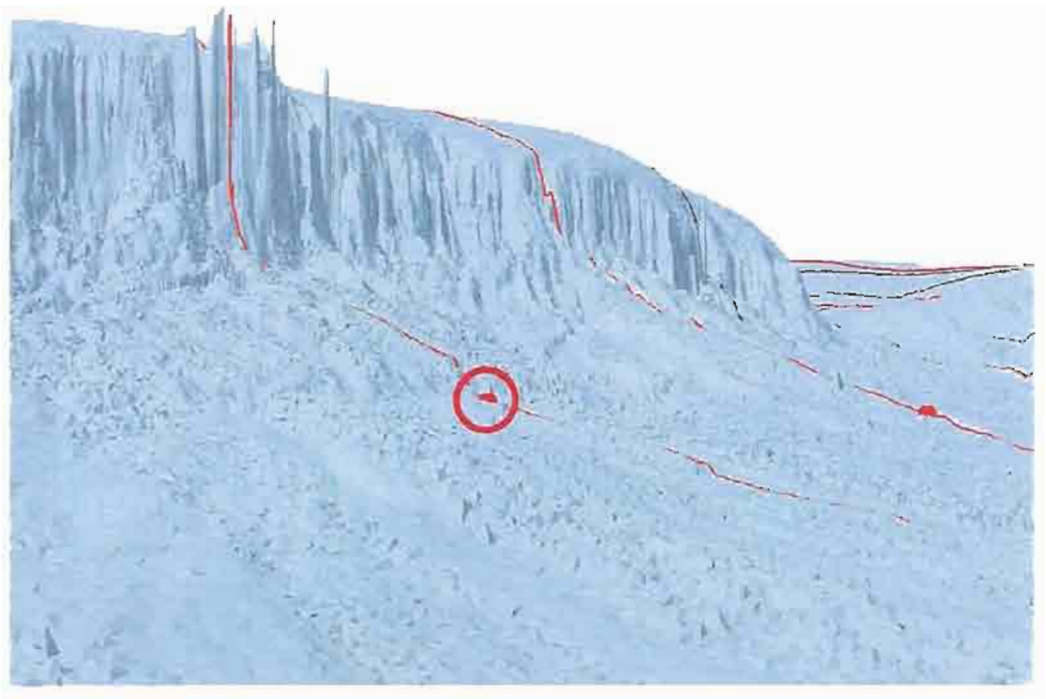
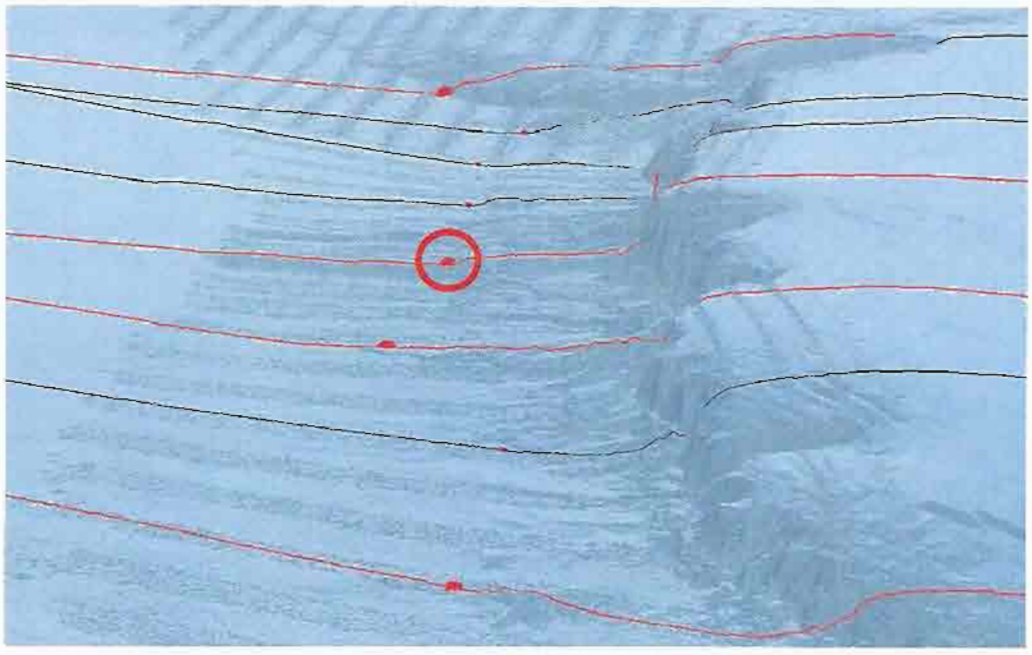


Figure 13



(iii) FOS 51

52. The location of FOS 51 is at the western edge of the Porcupine Bank.

53. FOS 51 point is selected on the basis of morphology on the slope-rise profile by using CARIS LOTS™ at a local change of gradient in unclear distinction between the slope and the rise [see Figure 14].

54. Established on the basis of two-segment slope concept according to which the largest peak in maximum change of gradient is interpreted as the boundary between upper and lower slope. The BOS is defined on the basis of morphology with some geological and geophysical evidence.

Figure 14

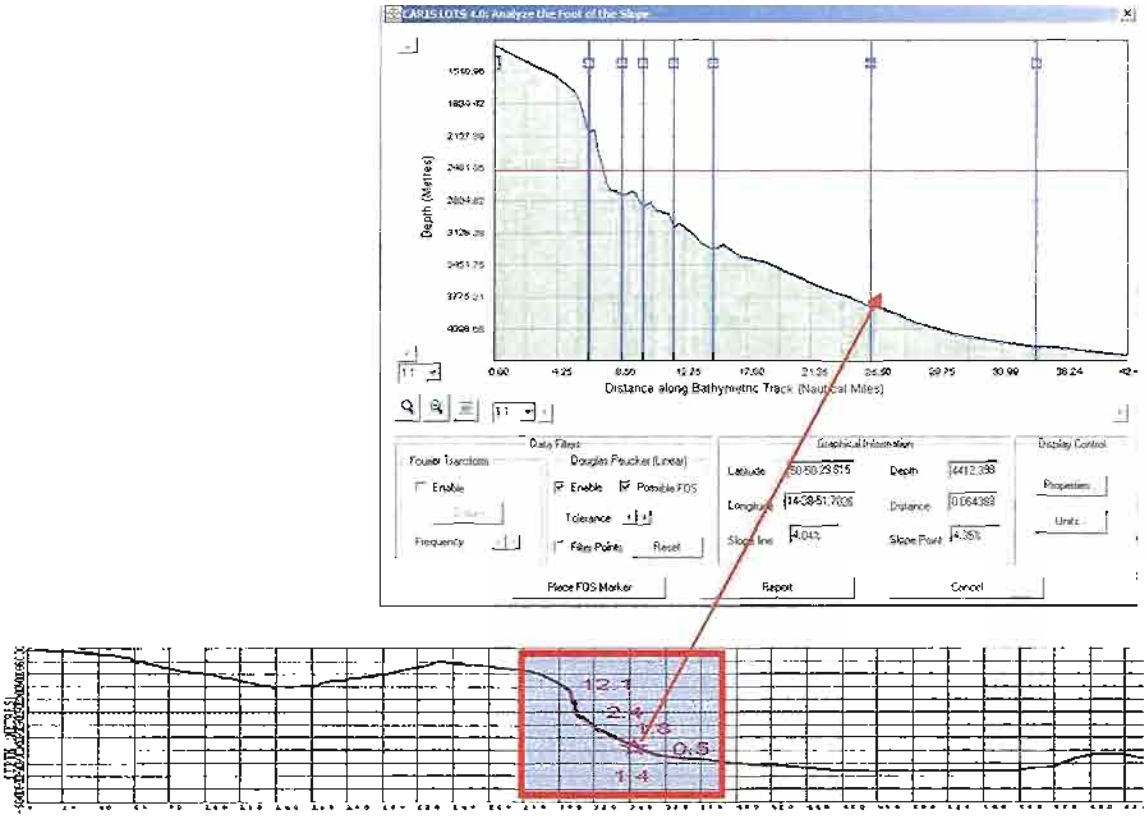
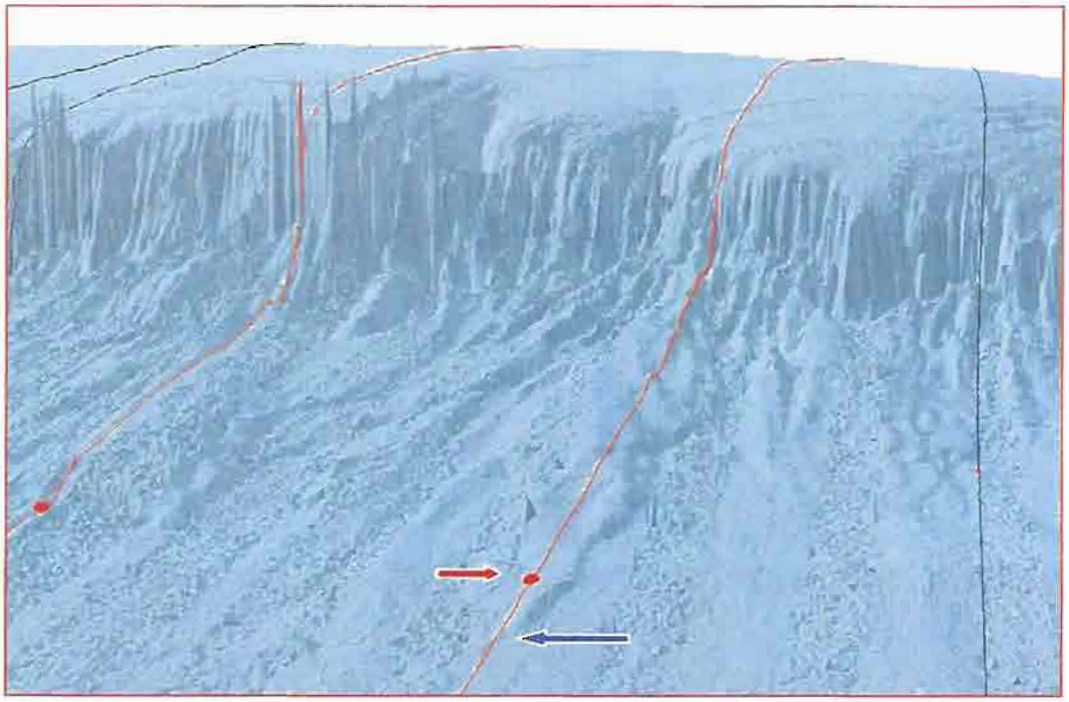


Figure 15

Figure 16



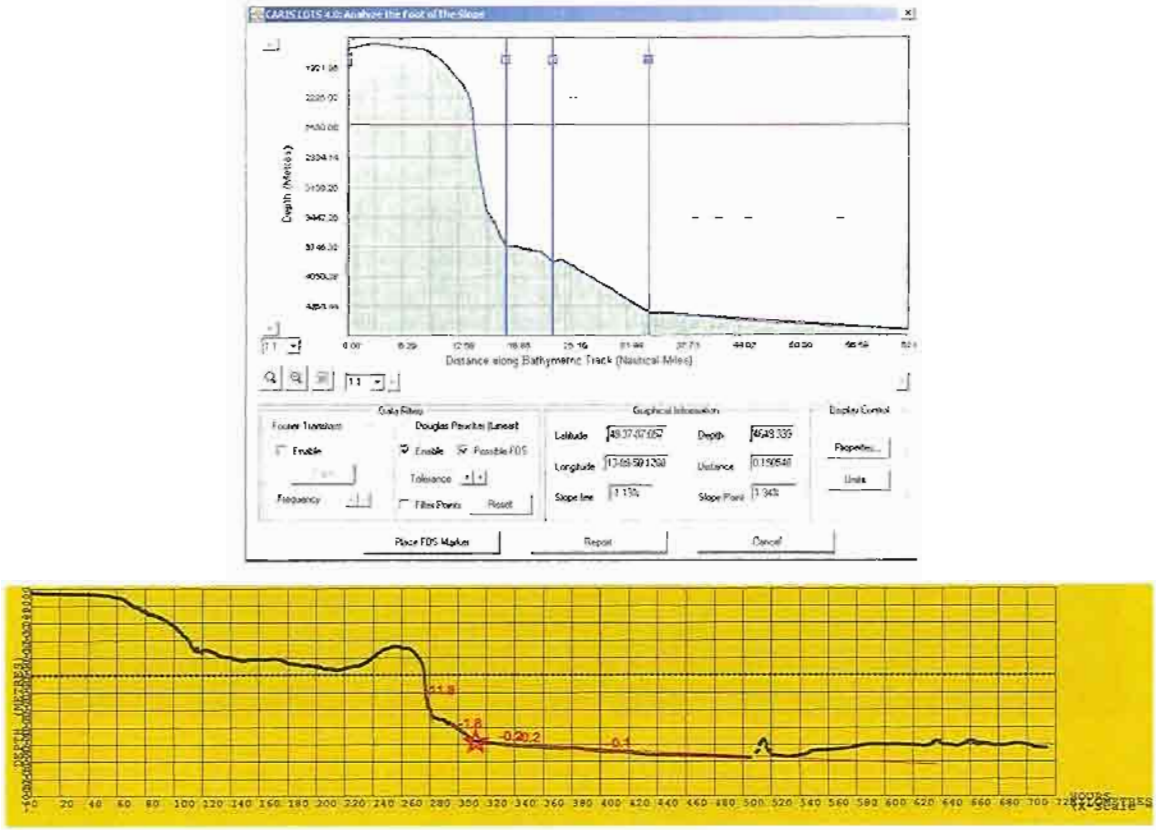
55. The 3D view contained in Figure 15, was prepared by the Subcommission on the basis of multi-beam bathymetry data for FOS 51. It clearly shows the lower slope, which is natural extension of the upper part and appears to be an integral part of the single whole morphological feature of the slope with a lower part extensively modified by processes of slope failure. The image of the lower slope [Figure 16] differs substantially from the image of the surrounding rise area. From these 3D images it also appears that the proposed FOS 51 is located within the "lower slope".

56. The Commission recommends that the selected FOS 51, from which the FPs 2-20 were established using the FOS + 60 M formula, be accepted.

(iv) FOS 57

57. FOS 57 point is selected on the basis of morphology on the slope-rise profile by using CARIS LOTS™ at the base of the lower slope, in the context of their two-segment continental slope concept [see Figure 17].

Figure 17



58. The 3D image in the area of FOS 57 [see Figure 18] shows a lower slope feature generated by slumping and slope failure.

59. Low rate of sedimentation, due to the absence of any important continental sediment source, resulted in reduced lower slope and hardly any continental rise development.

Figure 18

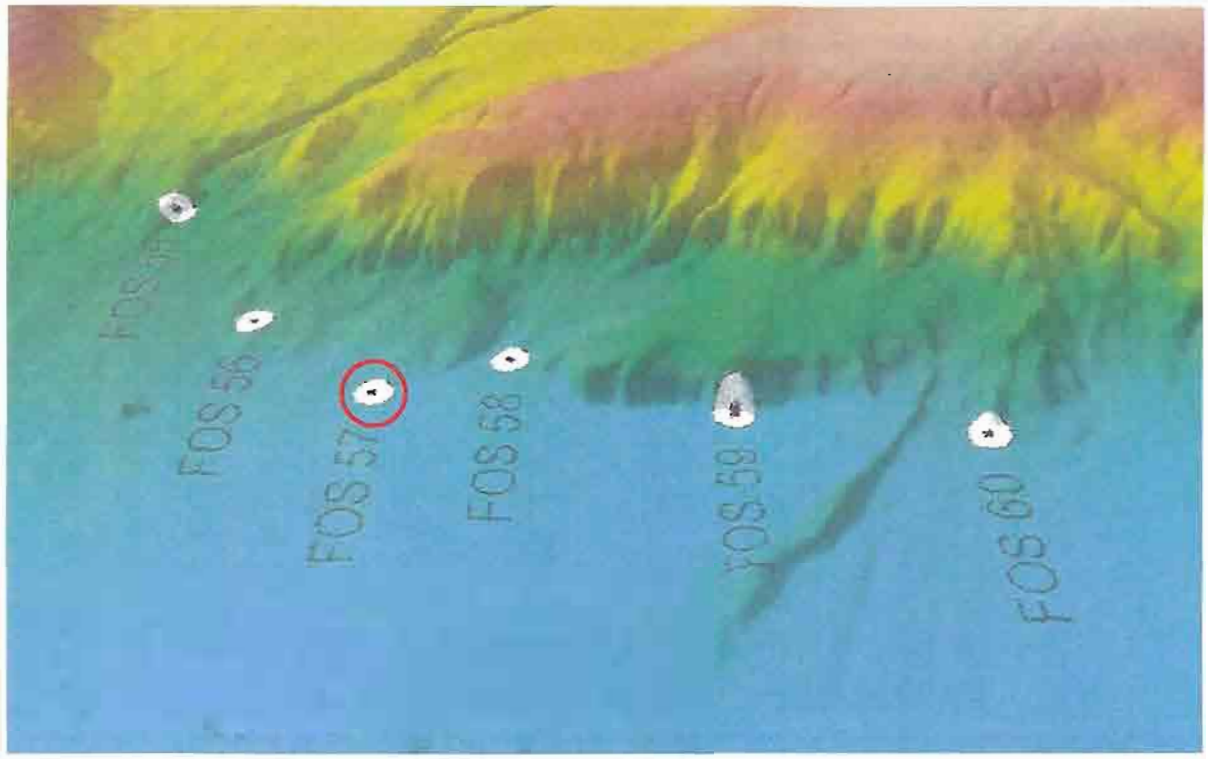
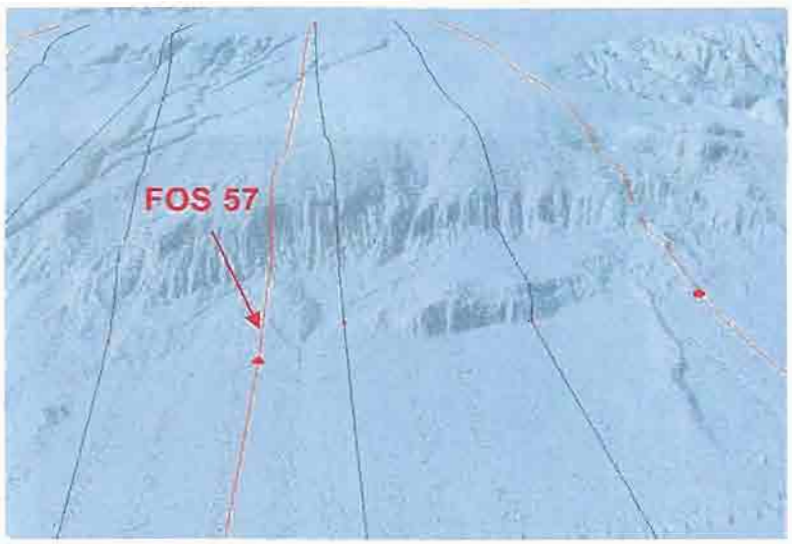


Figure 19



60. The Commission recommends that the selected FOS 57, from which the FPs 21-32 were established using the FOS + 60 M formula, be accepted.

(v) FOS 60

61. FOS 60 is established, with sufficient geophysical evidence, at the BOS. It is selected on the basis of morphology where the maximum change in the gradient occurs, where the rise has a gradient of 0.4° (that is within the expected range of < 0.5° for a rise), and the regional gradient of the lower slope is ~2 ° [see Figures 20 - 23].

Figure 20

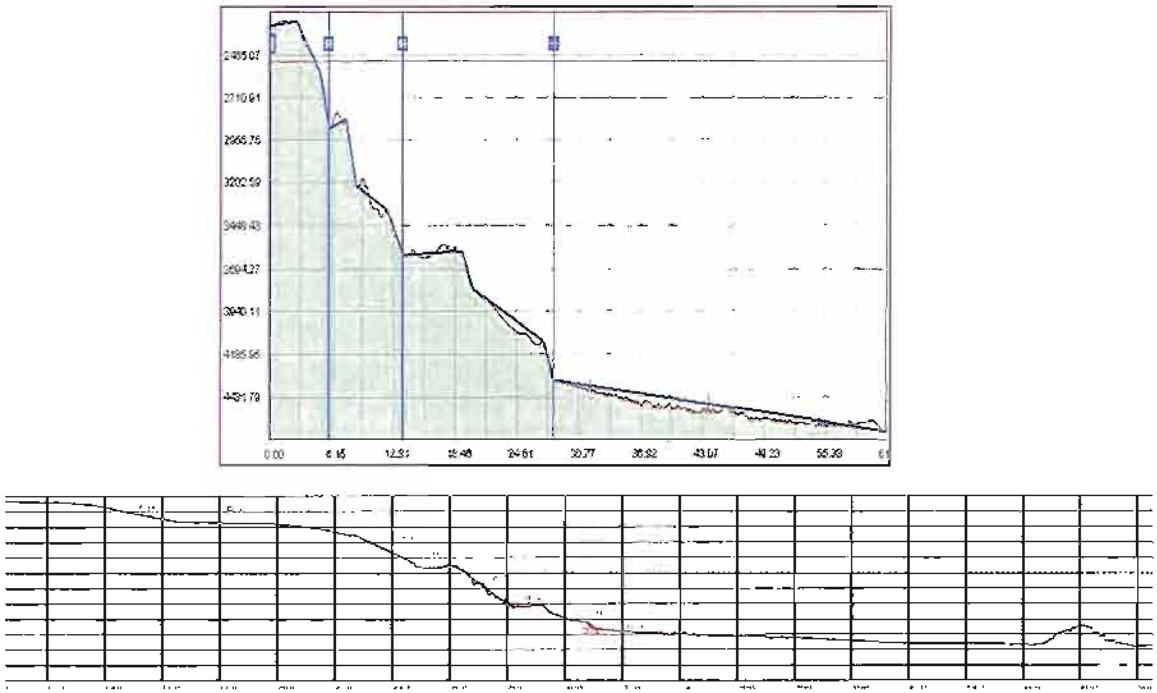
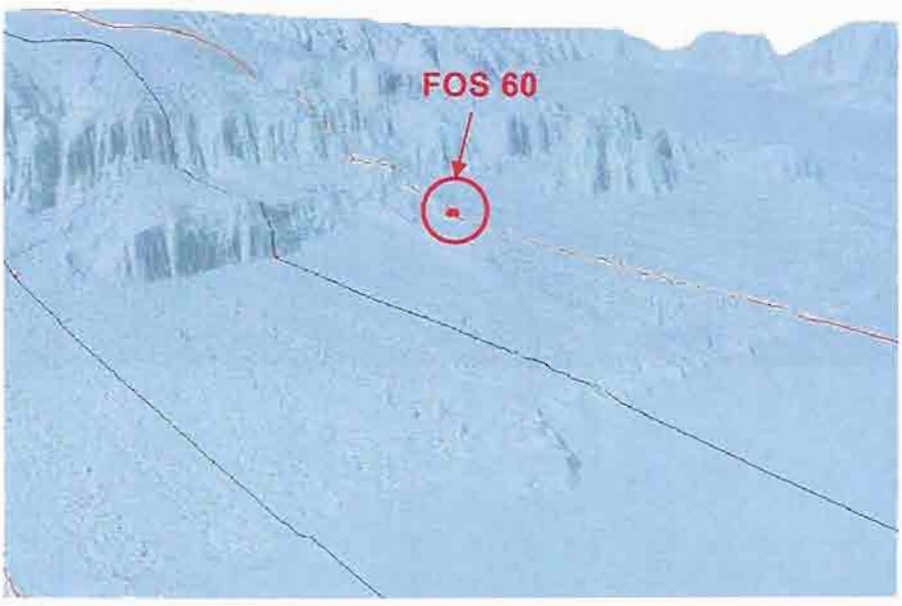


Figure 21

Figure 22

Figure 23



62. The Commission recommends that the selected FOS 60, from which the FPs 33-39 were established using the FOS + 60 M formula, be accepted.

c. Consideration of adjustments to outer limit

63. The Commission examined the proposal of the Irish Delegation to adjust the proposed limit by introducing a new fixed point, FP 15, generated from FOS 53. This was not endorsed by the Commission on scientific and technical grounds. The Delegation accepted this view.

64. The Commission concluded that the location of FOS 53 that generated the revised FP 15 could not be justified on scientific and technical grounds. The 3-D view of the Irish margin prepared by the Subcommission on the basis of multi-beam bathymetry data for FOS 53 clearly shows that the high is separated from the lower slope [see Figure 24]. The image also indicates that the high is a mound-like structure within the surrounding rise area.

Figure 24

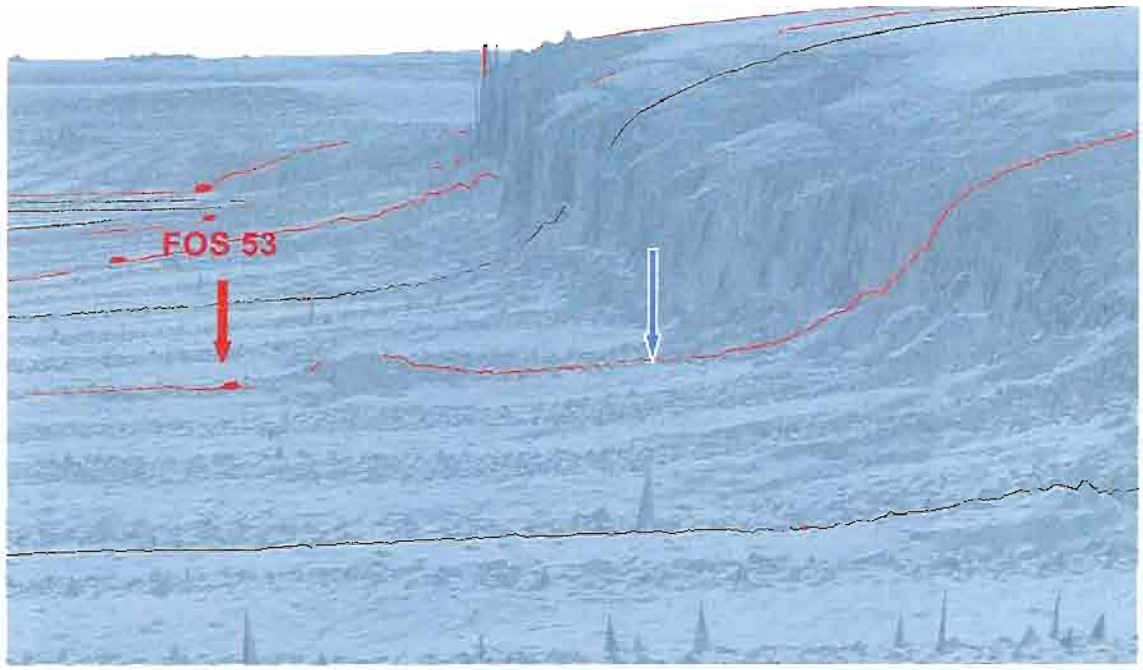
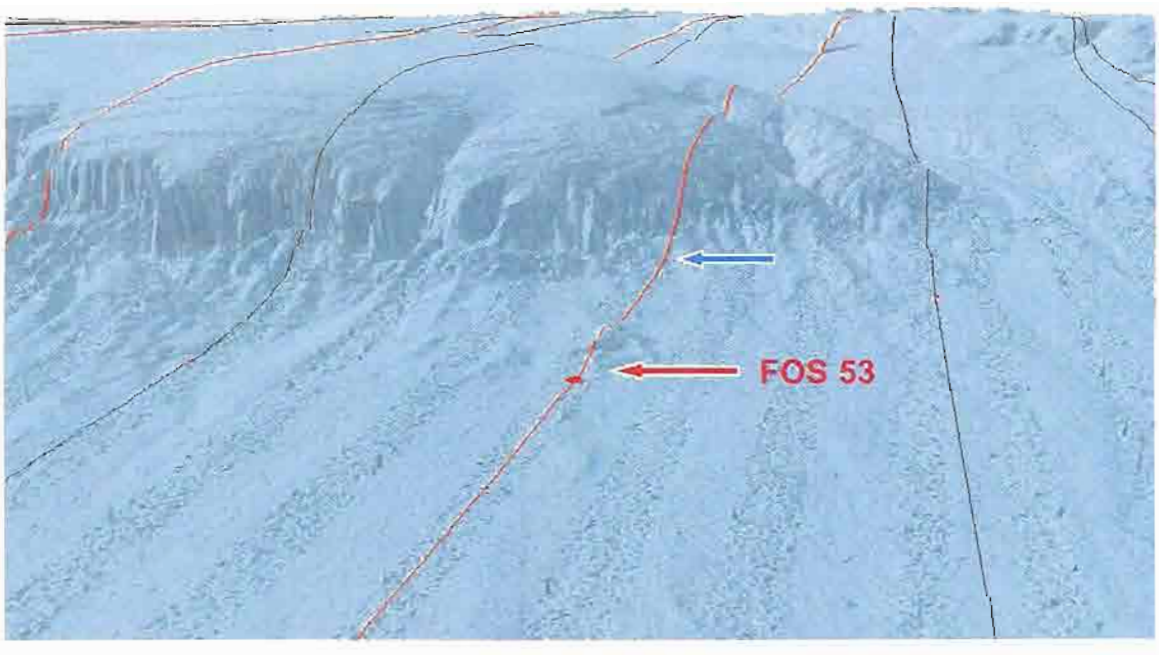


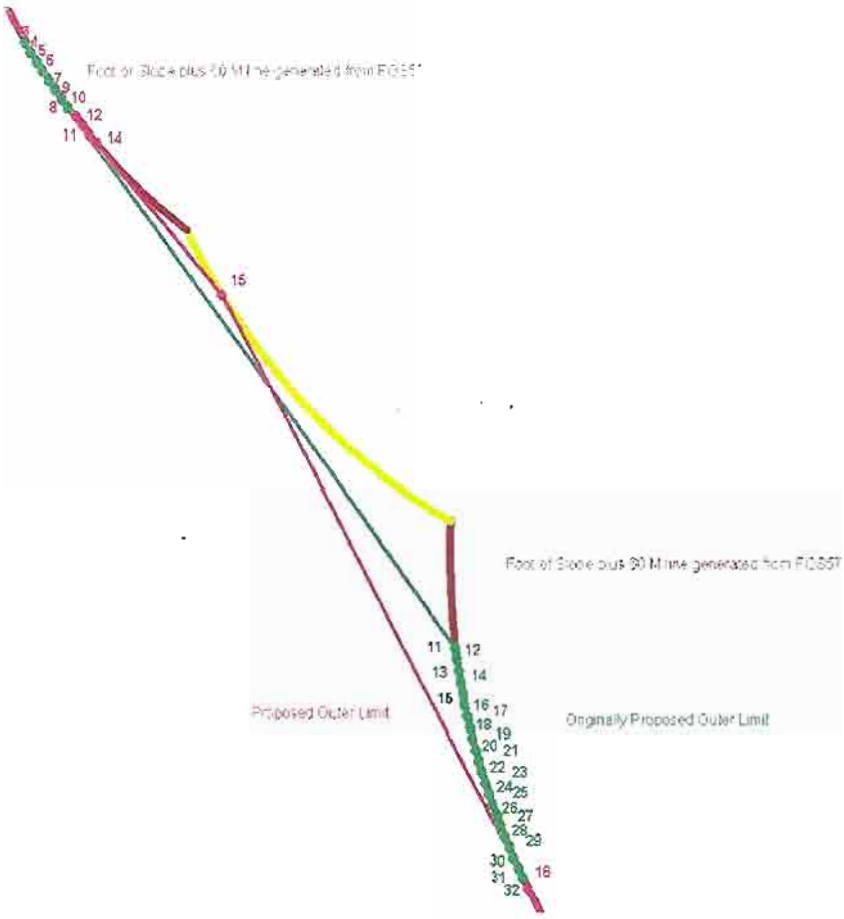
Figure 25



65. In the absence of any evidence to prove otherwise, the location of FOS 53 [see Figure 25 - red arrow] should be taken as being on the rise and the FOS should be relocated to the maximum change in gradient landward of the seafloor high, in the region indicated by the blue arrow.

66. Figure 26 illustrates the difference between the originally proposed outer limit and the outer limit using FP 15 constructed from FOS 53.

Figure 26



67. The introduction of FP 15 from FOS 53 was not endorsed by the Commission on scientific and technical grounds. The Delegation of Ireland accepted this view and excluded FOS 53 from the construction of the final outer limit.

d. Verification of seismic information and sediment thickness points

68. In the course of the examination the Commission:

- Ensured all necessary seismic information was present;
- Examined/assessed quality/suitability of the information;
- Verified the interpretation of the top of sediment (seafloor) and the top of basement;
- Verified the velocity information used in the depth conversion of the seismic data;
- Verified the depth conversion approach and computations;
- Verified error estimates;

- Verified the geodetic computations used to determine the 1 per cent sediment thickness point locations using two different methods;

- Checked that the same continuous sediment apron was involved and that there was continuity to the FOS.

69. Multichannel seismic reflection line PAD95-12 crosses both FOS 46 and outer limit fixed point FP 1 that was defined using the one per cent sediment thickness formula based on computations from FOS 46. Similarly, multichannel seismic reflection line PAD95-13 crosses both FOS 50 and outer limit fixed point FP 2 that was defined using the one per cent sediment thickness formula based on computations from FOS 50. Both seismic lines PAD95-12 and -13 form part of a seismic survey acquired in 1995 for the Petroleum Affairs Division of the then Department of Transport, Energy and Communications of Ireland for the specific propose of defining sediment thickness along the Irish continental margin to support definition of its extended continental shelf. The PAD95 survey was conducted by geophysical contractor Schlumberger/G-P and used dGPS navigation; a 320 channel, 4000 m seismic streamer with a 12.5 m group interval; a 2368 cubic inch air-gun array operated at a pressure of 2000 psi; and was recorded with a 10 second record length and 2 ms sample interval. The PAD95 seismic data were processed by geophysical contractor Spectrum Energy & Information Technology Ltd. in 1996 to produce 54 fold data using a relatively standard 2D seismic processing sequence. The seismic data on lines PAD95-12 and -13 is of good quality and is appropriate for use in the determination of 1 per cent sediment thickness points.

70. The reflection time to depth conversion for the PAD95 seismic lines was conducted using interval velocities derived from seismic stacking velocities using the Dix equation at each velocity analysis location. Ireland used a conservative approach in its time/depth conversion by choosing the interval velocity of the sedimentary section minus 10 per cent to estimate sediment thickness. A comparison between the measured sonic velocities on cores from DSDP sites in the region with the interval velocities derived from seismic profiles through the DSDP sites showed relatively good agreement despite the inherent problems involved in such comparisons. The Commission accepts that plausible stacking velocities and thus derived interval velocities were utilised by Ireland.

71. The Commission's analyses, verifications and checking of the velocity data and supporting information submitted validates the interval velocities employed by Ireland in the time to depth conversion, and its use in the determination of sediment thickness.

72. The Commission agrees with Ireland's conclusion that it can be established that there is a continuous sedimentary apron along the margin in the region of the sediment thickness points, and that continuity of sediments exists between the sediment thickness points and the relevant FOSs. Regional seismic and potential field data indicates that some small areas of basement outcrop at the seafloor on the seismic line between the sediment thickness point defining FP 2 and related FOS 50, are localised highs and do not disrupt continuity back to the FOS zone.

73. The Commission agreed that Ireland's approach to the determination of the sediment thickness points is verifiable and acceptable.

(i) Application of the Sediment Thickness Formula

74. Two sediment thickness points lie beyond 200 M and the 60 M formula line in the northern part of the region and are therefore relevant to the outer limit in the partial Submission of Ireland

75. Ireland adopted a conservative approach to defining the sediment thickness points utilising an average interval velocity for the sediments of -10 per cent of the mean in the vicinity of each sediment thickness point.

76. Initially the two sediment thickness points did not meet the 1 per cent criteria, but, following discussions and clarifications, the Delegation of Ireland made minor amendments to their locations that brought them into conformity with article 76.

(ii) Amendment of location of sediment thickness points defining outer limit FP 1 and FP 2

77. Implications of the various amendments to the sediment thickness points defining outer limits FP 1 and FP 2:

FP	*As per Original Submission*	*As per Revision and Recommendation*	*Differences*
1	**51.0376718 N**	**51.0369536 N**	**- 00.0007182**
	-17.4926083 W	**-17.4934128 W**	**+ 00.0008045**
2	**50.2478896 N**	**50.2489863 N**	**+ 00.0010967**
	-16.7035439 W	**-16.7005384 W**	**- 00.0030055**

e. Verification of constraint lines

78. Envelope of 350 M arcs: the envelope of arcs defined at a distance of 350 M from the baselines from which the territorial sea is measured forms the outer constraint line throughout the region of the partial Submission of Ireland. This constraint line was verified and agreed [see Figure 27].

79. 2,500 m isobath + 100 M: the envelope of arcs at 100 M from the 2,500 m isobath does not exceed the breadth of the 350 M constraint line at any location throughout this region [see Figure 27].

f. Verification and conformity of the outer limit

80. The 60 M formula line exceeds the breadth of the sediment thickness formula line along all but the northern part of the region and thus contributes directly to the determination of the outer limit of the continental shelf throughout most of the region.

81. Two sediment thickness formula points lie beyond 200 M and the 60 M formula line in the northern part of the region and therefore contribute directly to the outer limit in this portion of the partial Submission of Ireland

82. Ireland's approach to the determination of the sediment thickness points has been verified and accepted.

83. The formula line does not extend beyond the 350 M constraint at any location.

III. Recommendations

84. The partial Submission satisfied the test of appurtenance, and Ireland is entitled to delineate the outer limit of its extended continental shelf beyond 200 M;

85. The location of the BOS, as well as the concept of a two-segment continental slope, is accepted;

86. The selection of FOSs 46, 50, 51, 57 and 60 is endorsed;

87. FOS 53 is not endorsed on scientific and technical grounds;

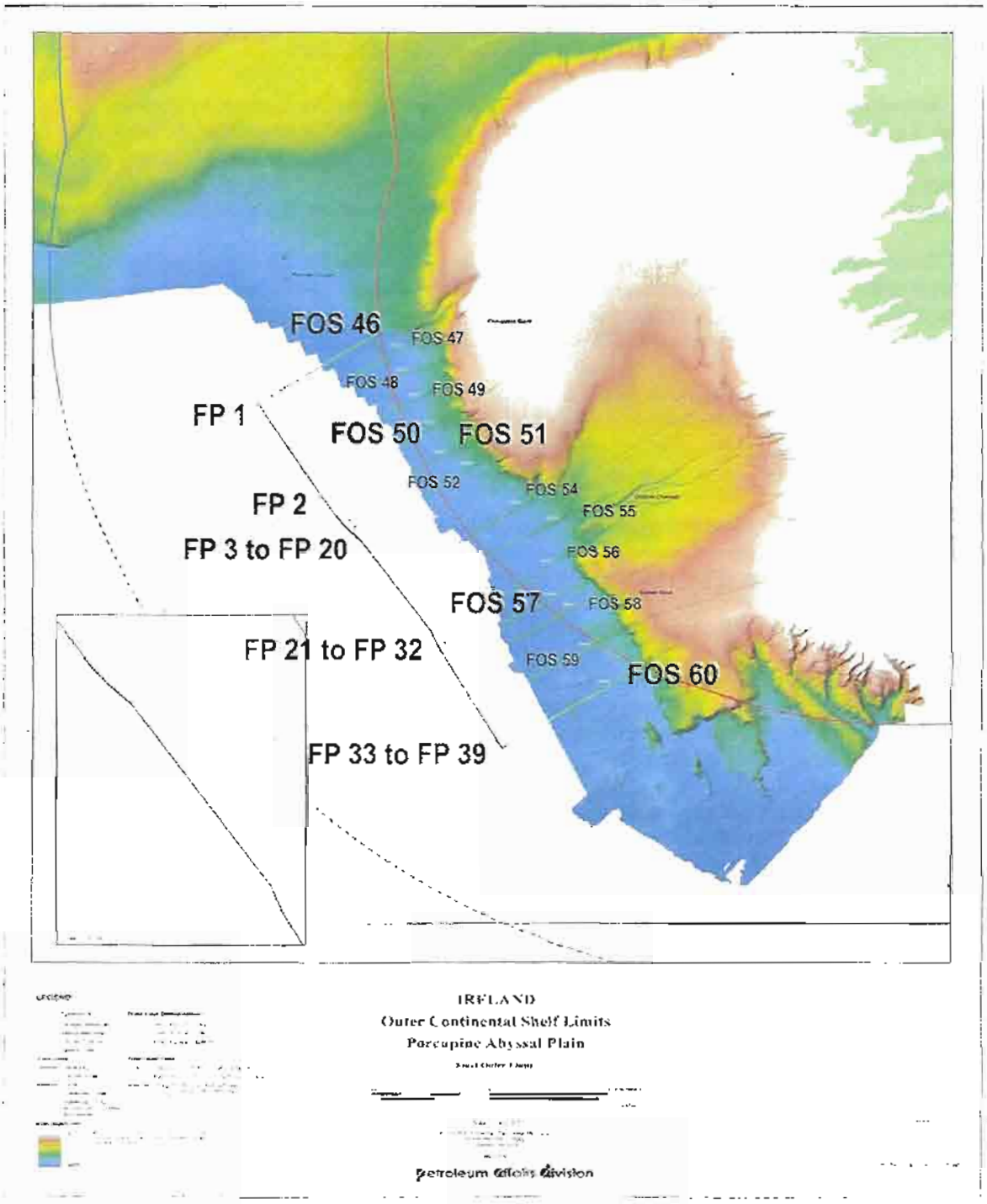
88. The adjusted sediment thickness points forming new FP 1 and FP 2 generated from FOSs 46 and 50 respectively, are accepted;

89. The Commission recommends that the outer limit of the extended continental shelf of Ireland in the area abutting the Porcupine Abyssal Plain is to be established as per Table 3 as illustrated in Figure 27:

Table 3 - Fixed points recommended by the Commission to be used to define the outer limit of the extended continental shelf of Ireland in the area abutting the Porcupine Abyssal Plain

FP	Latitude N	Longitude W	Method	Source	From FP	To FP	Distance (m)	Distance (M)
1	51.0369536	-17.4934128	1% Sediment Thickness	FOS 46				
2	50.2489863	-16.7005384	1% Sediment Thickness	FOS 50	1	2	104056.81	56.19
3	50.0691902	-16.5126452	FOS + 60 M arc	FOS 51	2	3	24088.13	13.01
4	50.0554937	-16.4979397	FOS + 60 M arc	FOS 51	3	4	1851.94	1.00
5	50.0419552	-16.4828907	FOS + 60 M arc	FOS 51	4	5	1851.88	1.00
6	50.0285778	-16.4675026	FOS + 60 M arc	FOS 51	5	6	1851.88	1.00
7	50.0153645	-16.4517798	FOS + 60 M arc	FOS 51	6	7	1851.92	1.00
8	50.0023213	-16.4357247	FOS + 60 M arc	FOS 51	7	8	1851.83	1.00
9	49.9894483	-16.4193439	FOS + 60 M arc	FOS 51	8	9	1851.95	1.00
10	49.9767514	-16.4026397	FOS + 60 M arc	FOS 51	9	10	1851.97	1.00
11	49.9642336	-16.3856211	FOS + 60 M arc	FOS 51	10	11	1851.81	1.00
12	49.9518981	-16.3682904	FOS + 60 M arc	FOS 51	11	12	1851.79	1.00
13	49.9397464	-16.3506497	FOS + 60 M arc	FOS 51	12	13	1852.04	1.00
14	49.9277843	-16.3327081	FOS + 60 M arc	FOS 51	13	14	1851.89	1.00
15	49.9160151	-16.3144701	FOS + 60 M arc	FOS 51	14	15	1851.75	1.00
16	49.9044388	-16.2959378	FOS + 60 M arc	FOS 51	15	16	1852.00	1.00
17	49.8930614	-16.2771204	FOS + 60 M arc	FOS 51	16	17	1851.82	1.00
18	49.8818844	-16.2580199	FOS + 60 M arc	FOS 51	17	18	1851.91	1.00
19	49.8709124	-16.2386410	FOS + 60 M arc	FOS 51	18	19	1851.92	1.00
20	49.8601470	-16.2189926	FOS + 60 M arc	FOS 51	19	20	1851.83	1.00
21	49.0478481	-15.3693211	FOS + 60 M arc	FOS 57	20	21	109346.26	59.04
22	49.0320589	-15.3612745	FOS + 60 M arc	FOS 57	21	22	1851.86	1.00
23	49.0163592	-15.3528370	FOS + 60 M arc	FOS 57	22	23	1851.81	1.00
24	49.0007521	-15.3440066	FOS + 60 M arc	FOS 57	23	24	1851.99	1.00
25	48.9852450	-15.3347876	FOS + 60 M arc	FOS 57	24	25	1851.81	1.00
26	48.9698395	-15.3251846	FOS + 60 M arc	FOS 57	25	26	1851.85	1.00
27	48.9545401	-15.3151976	FOS + 60 M arc	FOS 57	26	27	1851.94	1.00
28	48.9393514	-15.3048333	FOS + 60 M arc	FOS 57	27	28	1851.88	1.00
29	48.9242780	-15.2940895	FOS + 60 M arc	FOS 57	28	29	1851.93	1.00
30	48.9093243	-15.2829750	FOS + 60 M arc	FOS 57	29	30	1851.78	1.00
31	48.8944919	-15.2714901	FOS + 60 M arc	FOS 57	30	31	1851.97	1.00
32	48.8797885	-15.2596368	FOS + 60 M arc	FOS 57	31	32	1851.84	1.00
33	48.0979064	-14.6273868	FOS + 60 M arc	FOS 60	32	33	98708.60	53.30
34	48.0833284	-14.6153696	FOS + 60 M arc	FOS 60	33	34	1851.73	1.00
35	48.0688832	-14.6029975	FOS + 60 M arc	FOS 60	34	35	1851.96	1.00
36	48.0545769	-14.5902751	FOS + 60 M arc	FOS 60	35	36	1851.94	1.00
37	48.0404143	-14.5772069	FOS + 60 M arc	FOS 60	36	37	1851.80	1.00
38	48.0263984	-14.5637951	FOS + 60 M arc	FOS 60	37	38	1851.80	1.00
39	48.0170407	-14.5545155	FOS + 60 M arc	FOS 60	38	39	1249.71	0.67

Figure 27


FOS 46
FOS 47
FOS 48
FOS 49
FP 1
FOS 50
FOS 51
FOS 52
FOS 54
FOS 55
FP 2
FP 3 to FP 20
FOS 56
FOS 57
FOS 58
FP 21 to FP 32
FOS 59
FOS 60
FP 33 to FP 39
IRELAND
Outer Continental Shelf Limits
Porcupine Abyssal Plain
Petroleum Affairs Division

Annex I
List of materials submitted to the Commission and Subcommission

1. List of the materials contained in the original Submission of Ireland made to the Commission on 25 May 2005

I. *Ireland - Submission to the Commission on the Limits of the Continental Shelf pursuant to Article 76, paragraph 8 of the United Nation Convention on the Law of the Sea 1982 in respect of the area abutting the Porcupine Abyssal Plain. Part I - executive summary – including Appendix 1.1: List of coordinates defining the outer limits of Ireland's extended continental shelf in the area abutting the Porcupine Abyssal Plain* (22 copies, 6 pages, provided in hard copy and on DVD – file name: Submission of Ireland_executive summary.pdf);

II. *Ireland - Submission to the Commission on the Limits of the Continental Shelf pursuant to Article 76, paragraph 8 of the United Nation Convention on the Law of the Sea 1982 in respect of the area abutting the Porcupine Abyssal Plain. Part II – Geology and Geomorphology of Ireland and Its Continental Shelf* (8 copies, 24 pages, provided in hard copy and on DVD – file name: Submission of Ireland_Part 2.pdf);

III. *Ireland - Submission to the Commission on the Limits of the Continental Shelf pursuant to Article 76, paragraph 8 of the United Nation Convention on the Law of the Sea 1982 in respect of the area abutting the Porcupine Abyssal Plain. Part III – Delineation of the Irish Continental Shelf* (8 copies, 140 pages, provided in hard copy and on DVD – file name: Submission of Ireland_Part 3.pdf);

IV. *Ireland - Submission to the Commission on the Limits of the Continental Shelf pursuant to Article 76, paragraph 8 of the United Nation Convention on the Law of the Sea 1982 in respect of the area abutting the Porcupine Abyssal Plain. Part IV – Supplemental information* (2 copies):
   A. Appendix 3.2: Explanation of Bathymetric Data (3 pages);
   B. Appendix 3.4: Crosscheck Histograms (6 pages);
   C. Enclosures (maps):
      1. Outer Continental Shelf Limits – Porcupine Abyssal Plain (A0);
      2. Bathymetric and Seismic Surveys – Porcupine Abyssal Plain (A0);
      3. Outer Continental Shelf Limits – Porcupine Abyssal Plain (A3);
      4. Bathymetric and Seismic Surveys – Porcupine Abyssal Plain (A3);

V. *Ireland - Submission to the Commission on the Limits of the Continental Shelf pursuant to Article 76, paragraph 8 of the United Nation Convention on the Law of the Sea 1982 in respect of the area abutting the Porcupine Abyssal Plain. Other Appendices* (2 copies):
   A. Appendix 3.5:
      1. WI Lines:
         a. WI 07 (1 profile);
         b. WI 19 (2 profiles);
         c. WI 23 (1 profile);
      2. PAD 95 Lines:
         a. PAD 95 12 (1 profile);
         b. PAD 95 13 (1 profile);
         c. PAD 95 14 (1 profile);
         d. PAD 95 15 (1 profile);
         e. PAD 95 16 (1 profile);
      3. WAM Lines:
         a. WAM 1/2/3 (1 profile);
         b. WAM 4A (1 profile);
         c. WAM 4B (1 profile);

d. WAM 5 (1 profile);

4. CM Lines:
    a. CM 04 (5 profiles);
    b. CM 05 (7 profiles);
    c. CM 06 (5 profiles);
    d. CM 07 (1 profile);
    e. CM 08 (4 profiles);
    f. CM 10 (3 profiles);
    g. CM 11 (2 profiles);

B. Appendix 3.8: Foot of the Slope profiles 46-60;

C. Appendix 3.9: Interpreted Horizon/Base of sediments lines:
    1. CM Lines:
        a. CM 06 (1 profile);
        b. CM 11 (1 profile);
    2. PAD 95 Lines:
        a. PAD 95 12 (1 profile);
        b. PAD 95 13 (1 profile);
        c. PAD 95 14 (1 profile);
        d. PAD 95 15 (1 profile);
        e. PAD 95 16 (1 profile);
    3. WI Line: WI 23 (1 profile);

VI. DVD (entitled "Digital data" – provided in 2 copies) in addition to the files indicated above contains the following data:

A. Appendix 3.1 **[digital only]** (PAD 1996 Bathymetry Survey Metadata) containing:
    1. CARIS LOTS PAD bathymetry zonations (2 pages - CARIS_FOS_Zones.doc);
    2. Script to concatenate PAD '96 bathymetry.llz files into 4 zone megafiles (concat_LLZ_files.txt);
    3. Bathymetric.llz file metadata (2 spreadsheets: LEGS1_2.xls; LEG3.xls) ;

B. Appendix 3.2 (CTD, XBT and Sippican data) containing:
    1. Explanation of Bathymetric Data (3 pages - Explanation of Bathymetric Data.doc);
    2. Directory "Velocity profiles" containing 87 spreadsheets: Sound Velocity Calculation / Comparison Sheets;

C. Appendix 3.3 **[digital only]** (Depth soundings – LLZ Files) containing: 2 LLZ files: PAD_1996_ZONE3.LLZ; PAD_1996_ZONE4.LLZ;

D. Appendix 3.4 (Crosscheck Histograms) containing DFA Histograms.doc;

E. Appendix 3.5 (Seismic Profiles) containing:
    1. Directory "Navigation Data" containing:
        a. 4 text files;
        b. Directory "Originals" containing 5 text files;
    2. Directory "SEG_Y Data" containing:
        a. Directory "CM_Lines DMO stack" containing 2 SEG-Y files;
        b. Directory "CM_Lines Migrated" containing 1 shapefile; 1 .sgx file; 2 SEG-Y files;
        c. Directory "PAD95" containing 5 SEG-Y files;
        d. Directory "WI lines" containing 2 SEG-Y files;

F. Appendix 3.6 **[digital only]** (Potential Field Database) containing Potential Data Survey Listing (spreadsheet: Potential Data Survey Listing.xls);

G. Appendix 3.7 **[digital only]** (2500m + 100M coordinates) containing 2500+100m_CARIS.txt;

H. Appendix 3.8 (Foot of Slope Profiles and data) containing the directory "FOS Profiles" with 75 Foot of the Slope files for Foot of the Slope profiles 46-60 (30 bitmap files containing CARIS LOTS analysis of the Foot of the Slope profiles + 45 txt files containing Foot of the Slope point from bathymetric track analysis report);

I. Appendix 3.10 [**digital only**] (Seisworks output files) containing Top_basement_Picks.txt; Sediment_isochron.dat; Seafloor_Picks.dat;
J. Appendix 3.11 [**digital only**] (Velocity analysis input and output files for PAD91-12 to 16) containing the directory "Velocity Data" (3 .txt files);
K. "Enclosures" containing:
    1. Map: Ireland – Outer Continental Shelf Limits – Porcupine Abyssal Plain (Map_Ireland_Outer_CS_Limits.pdf);
    2. Map: Ireland – Bathymetric and Seismic Surveys – Porcupine Abyssal Plain (Map_Ireland_Bathy_Seismic_Surveys.pdf);
    3. Map: Ireland – Bathymetric and Seismic Surveys – Porcupine Abyssal Plain (Map_Ireland_Bathy_Seismic_Surveys_Ver2.pdf);
L. File Submission of Ireland_References.pdf (10 pages) containing an index of the References contained in the Submission [please note the actual references were submitted on 25 July 2005 in hard copy and on CD-Rom].

2. List of the additional materials submitted to the Commission on 25 July 2005

VII. *Ireland - Submission to the Commission on the Limits of the Continental Shelf pursuant to Article 76, paragraph 8 of the United Nation Convention on the Law of the Sea 1982 in respect of the area abutting the Porcupine Abyssal Plain.* *References* (1 Copy of 4 Volumes containing scientific reference material divided alphabetically by author, as follows: A-G, H-M, N, O-Z, provided in hard copy and on a CD-Rom entitled "References". Total of 28 scientific articles; 2 scientific papers; and 1 poster available in digital format only);

VIII. DVD entitled "GIS Data" containing the following directories:
A. "ArcGIS" containing:
    1. Ireland_Continental_Shelf.mxd
    2. Continental_Shelf.mdp
    3. Directory "Grids" containing 5 grids, 5 georeferenced images
B. "CARIS" containing:
    1. 2 CARIS grids

3. List of the additional materials submitted to the Subcommission on 30 August 2005

IX. *Ireland - Submission to the Commission on the Limits of the Continental Shelf pursuant to Article 76, paragraph 8 of the United Nation Convention on the Law of the Sea 1982 in respect of the area abutting the Porcupine Abyssal Plain.* *Presentation to the 16th Session of the Commission on the Limits of the Continental Shelf*. (42 slides - CLCS_Presentation_NYC_new.pps);

4. List of the additional materials submitted to the Subcommission on 1 September 2005

X. *List of manually generated coordinates defining the outer limits of Ireland's extended continental shelf area abutting the Porcupine Abyssal Plain.* All coordinates relate to the WGS84 geodetic reference system (1 page);
XI. 2 maps showing details of the formula lines used to define the outer limit of Ireland's extended continental shelf in the Porcupine Abyssal Plain as calculated automatically in CARIS LOTS and as calculated manually (1 page);
XII. Floppy disk containing the following documents:
A. List of coordinates defining the outer limits of Ireland.doc;
B. Continental Shelf Submission_manual_calc.doc;

5. List of the additional materials submitted to the Subcommission on 7 September 2005

XIII. IRL-DOC-01-07_Sept_2005: *Co-ordinates of Fixed Points used to define the Outer Limits of the Extended Shelf in the area abutting the Porcupine Abyssal Plain as determined by CARIS LOTS automated solution.* (2 pages);

XIV. IRL-DOC-02-07_Sept_2005 *Co-ordinates of Fixed Points used to define the Outer Limits of the Extended Shelf in the area abutting the Porcupine Abyssal Plain as plotted by CARIS LOTS and then selected manually.* (1 page);

XV. IRL-DOC-003-07_Sept_2005: *Outer Limit Generation in CARIS LOTS* (5 pages) ;

XVI. IRL-DOC-004-07_Sept_2005: *Generation of Profiles* (8 pages);

XVII. IRL-MAP-001-07_Sept_2005 (1 page)

XVIII. CD Rom entitled "Submission of Ireland – 7 September 2005" containing:

A. IRL-DOC-01-07_Sept_2005.doc;
B. IRL-DOC-02-07_Sept_2005.doc;
C. IRL-DOC-003-07_Sept_2005.doc;
D. IRL-DOC-004-07_Sept_2005.doc;
E. IRL-MAP-001-07_Sept_2005.doc;

6. List of the additional materials submitted to the Subcommission on 8 September 2005

XIX. IRL-LETT-02-08_Sept_2005: *Answers to Questions 1, 6, 7, 8* (5 pages);

XX. IRL-DOC-05-08_Sept_2005: *Coordinates of Foot of Slope (FOS) (with ID and FP points generated from each)* (1 page);

XXI. IRL-DOC-06-08_Sept_2005: *Basepoints, given in WGS 84 coordinate system, used in calculating the 200 and 350M limit (indicated with star), shown with source British Admiralty Chart number and scale.* (1 page);

XXII. CD Rom entitled "Submission of Ireland – 8 September 2005" containing:

A. IRL-DOC-005-08_Sept_2005.doc;
B. IRL-DOC-006-08_Sept_2005.doc;

7. List of the additional materials submitted to the Subcommission on 9 September 2005

XXIII. IRL-LETT-03-09_Sept_2005: *Answers to Questions 4, 9, 10, 11* (5 pages);

XXIV. IRL-DOC-07-09_Sept_2005: *Answer to Question 10c* (5 pages);

XXV. IRL-MAP-02-09_Sept_2005: *Ireland – Outer Continental Shelf Limits – Porcupine Abyssal Plain – Automatic Fixed Points Solution*;

XXVI. IRL-MAP-03-09_Sept_2005: *Ireland – Outer Continental Shelf Limits – Porcupine Abyssal Plain – Manual Fixed Points Solution*;

XXVII. CD Rom entitled "Submission of Ireland – 9 September 2005" containing:

A. IRL-DOC-07-09_Sept_2005.doc;
B. IRL-LETT-03-09_Sept_2005.doc;
C. 2 shapefiles: IRL-SHP-01-09_Sept_2005.shp: "FP Fixed Points manual solution" and IRL-SHP-02-09_Sept_2005.shp: "Straight Baselines connecting fixed points";
D. IRL-MAP-02-09_Sept_2005.pdf;
E. IRL-MAP-03-09_Sept_2005.pdf;

8. List of the additional materials submitted to the Subcommission dated 4 November 2005 and received on 11 November 2005

XXVIII. *Ireland - Submission to the Commission on the Limits of the Continental Shelf pursuant to Article 76, paragraph 8 of the United Nation Convention on the Law of the Sea 1982 in respect of the area abutting the Porcupine Abyssal Plain. Subcommission – Additional Information 25 October 2005*:

A. IRL-DOC-08-17_Oct_2005: *Further Comment Regarding Q.9 and Q.12 of the Subcommission to Ireland*;

B. IRL-DOC-09-17_Oct_2005: *Clarification regarding Q.10, Q.14 and Q.15*;
C. IRL-MAP-04-18_Oct_2005: *Ireland - Geology and Structural Elements of the Continental Shelf*;
D. CD Rom containing the above documents in electronic format as well as the following files:
    a. 3 Power Point presentations made at the sixteenth session (30 Aug.; 6 Sept.; 8 Sept. 2005);
    b. Seismic lines (interpreted and uninterpreted) as requested in Questions 5 and 10a by the Subcommission from PAD_95-12 to PAD_95-16 (.pdf files);
E. Seismic Lines as requested in Question 14 by the Subcommission (hard copy only):
    a. WI-9 (1 profile);
    b. WI-11 (2 profiles);
    c. WI-13 (1 profile);
    d. WI-15 (1 profile).

9. List of the additional materials submitted to the Subcommission dated 17 January 2006 and delivered on 23 January 2006

XXIX. *Ireland - Submission to the Commission on the Limits of the Continental Shelf pursuant to Article 76, paragraph 8 of the United Nation Convention on the Law of the Sea 1982 in respect of the area abutting the Porcupine Abyssal Plain. Subcommission – Additional Information 17 January 2006*:
A. IRL-MAP-05-17_Jan_2006: Map: Outer Continental Shelf Limits – Porcupine Abyssal Plain;
B. IRL-MAP-06-17_Jan_2006: Map: Outer Continental Shelf Limits – Porcupine Abyssal Plain;
C. IRL-MAP-07-17_Jan_2006: Map: Outer Continental Shelf Limits – Porcupine Abyssal Plain;
D. IRL-MAP-08-17_Jan_2006: Map: Outer Continental Shelf Limits – Porcupine Abyssal Plain;
E. Seismic Lines WI-11-2 and WI-15;
F. CD Rom entitled "Additional Information January 2006" containing the above documents in electronic format as well as the following directories and files:
    a. ArcGIS_Grids: 3 grids and 3 layer files;
    b. Seismic: 5 SEG-Y files, 7 images;
    c. Shapefiles: 12 shapefiles.

10. List of the additional materials submitted to the Subcommission on 25 January 2006

XXX. IRL-LETT-10-25_Jan_2006: *Answers to Questions 16-19* (4 pages - delivered by email on 27 January 2006);
XXXI. IRL-DOC-10-25_Jan_2006: *Answers to Questions 16.1-16.7* (7 pages);
XXXII. CD Rom entitled "Ireland CD 25 Jan 2006" containing the following directories and files (in additions to that listed in the previous table under the same date and those listed in the following table under the same date):
A. 2 power-point presentations made on 23 January 2006;
B. CARISLOTS_FOS_Output: 4 images, 8 text files (4 of which were provided in hard copy totalling 7 pages);
C. GIS_data: containing 3 grids, 3 layer files, 12 shapefiles;
XXXIII. CD-Rom entitled "Ireland – IPMMP CD – 25 Jan 2006" containing Kimbell's Study "Irish Passive Margins Modelling Project".

11. List of the additional materials submitted to the Subcommission on 26 January 2006

XXXIV. IRL-LETT-11-26_Jan_2006: *Answer to Question 22* (2 pages - delivered by email on 27 January 2006);
XXXV. CD-Rom entitled "Ireland CD 26 Jan 2006" containing:
A. IRL-Presentation-06-26_Jan_2006: *Submission to the Commission on the Limits of the Continental Shelf pursuant to Article 76, paragraph 8 of the United Nations Convention on the Law of the Sea 1982 in respect of the area abutting the Porcupine Abyssal Plain. Meetings between the Irish Delegation and the Subcommission established to examine the Submission of Ireland. 26th January 2006* (8 slides);
B. PAD95-09.jpg, PAD95-10.jpg, PAD95-11.jpg.

12. List of the additional materials submitted to the Subcommission on 27 January 2006

XXXVI. IRL-LETT-12-27_Jan_2006: *Answer to Question 16* (2 pages - delivered by email on 27 January 2006).

13. List of the additional materials submitted to the Subcommission on 10 April 2006

XXXVII. IRL-LETT-14-10_Apr_2006: *Answers to Question 10a, 20, 21, 23* (5 pages, provided in hard copy and by email on 19 April 2006).

XXXVIII. IRL-DOC-11-10_Apr_2006: *Geological and Geophysical Evidence for the Location of the Foot of the Continental Slope along the Irish Non-volcanic Passive Margin* (23 pages, 2 hard copies provided and on CD)

XXXIX. IRL-DOC-12-10_Apr_2006: *Q. 21. Comparison of Interval Velocities derived from CDP Stacking Velocities and DSDP Drill Holes* (7 pages, provided in hard copy and on CD)

XL. IRL-DOC-13-10_Apr_2006: *Sediment thickness values for SPs on lines PAD95-12 and PAD95-13 and distances to the foot of the slope (PAD95-12: FOS46 and PAD95-13: FOS50)* (1 page, provided in hard copy and on CD)

XLI. IRL-DOC-14-10_Apr_2006: *Co-ordinates of Fixed Points used to define the Outer Limits of the Extended Shelf in the area abutting the Porcupine Abyssal Plain* (1 page, provided in hard copy and on CD)

XLII. PAD95-12: *Seismic profile details PAD95-12 (1% Sediment thickness point SPN4783)* (1 image, 2 hard copies provided and on CD)

XLIII. PAD95-13: *Seismic profile details PAD95-13 (1% Sediment thickness point SPN11763)* (1 image, 2 hard copies provided and on CD)

XLIV. *Seismic Line WI-32* (5 profiles, 2 hard copies provided)

XLV. *Seismic Line PAD95-10* (1 profile, 2 hard copies provided)

XLVI. *Seismic Line PAD95-11* (1 profile, 2 hard copies provided)

XLVII. CD entitled "Submission of Ireland – Data CD – 10 April 2006" containing the following in addition to those listed above:

A. Sonic velocity data files for DSDP sites: 8 text files;
B. Scanned_Shackleton_Seismic: 1 image;
C. bullock_minshull_2005: *From continental extension to seafloor spreading: crustal structure of the Goban Spur rifted margin, southwest of the UK* (20 pages).

XLVIII. DVD entitled "Submission of Ireland – Data DVD – 10 April 2006" containing the following:

A. Seismic: 3 SEG-Y files, 3 images, 2 seismic lines interpreted, 2 seismic lines uninterpreted;
B. Fly-through movie;
C. Shapefiles directory (3 shapefiles).

14. List of the additional materials submitted to the Subcommission on 12 April 2006

XLIX. IRL-LETT-15-12-Apr_2006: *Answers to Questions 24, 25* (1 page - provided in hard copy and on CD on 19 April 2006).

L. IRL-DOC-15-10_Apr_2006: *Article 76 Provisions Used to Determine the Foot of the Continental Slope* (1 page - provided in hard copy and on CD on 19 April 2006).

LI. IRL-DOC-16-10_Apr_2006: *Q. 25 Additional seismic or other data required to support FOS 53 per se and FOS 57* (3 pages - provided in hard copy and on CD on 19 April 2006).

LII. Dingle & Scrutton 1979: *Sedimentary Succession and Tectonic History of a Marginal Plateau (Goban Spur, Southwest of Ireland)* (25 pages - provided in hard copy and on CD on 19 April 2006).

15. List of the additional materials submitted to the Subcommission on 19 April 2006

LIII. IRL-LETT-16-19_April_2006 (1 page – provided in hard copy)

LIV. CD entitled "Submission of Ireland – Data CD – 13 April 2006" containing the following in addition to digital versions of the entirety of Annex 14:

A. IRL-Presentation-07-10_Apr_2006: *Submission to the Commission on the Limits of the Continental Shelf pursuant to Article 76, paragraph 8 of the United Nations Convention on the Law of the Sea 1982 in respect of the area abutting the Porcupine Abyssal Plain. Meetings between the Irish Delegation and the Subcommission established to examine the Submission of Ireland. 10th April 2006* (22 slides).

16. List of the additional materials submitted to the Subcommission on 27 July 2006

LV. IRL-LETT-18-27_Jul_2006 (1 page - provided digitally on 27 July 2006).
LVI. IRL-DOC-19-27_Jul_2006: *Co-ordinates of Fixed Points used to define the Outer Limits of the Extended Shelf in the area abutting the Porcupine Abyssal Plain* (1 page - provided digitally on 27 July 2006).

17. List of the additional materials submitted to the Subcommission on 25 August 2006

LVII. IRL-LETT-19-25_Aug_2006 (2 pages - provided in hard copy and digitally on 25 August 2006).

18. List of the additional materials submitted to the Subcommission on 28 August 2006

LVIII. IRL-LETT-20-28_Aug_2006 (2 pages - provided in hard copy and digitally on 28 August 2006).
LIX. IRL-DOC-20-28_Aug_2006: *Sediment thickness values for SPs on lines PAD-95-12 and PAD95-13 and distances to the foot of the slope (PAD95-12: FOS46 and PAD95-13; FOS50). Mean interval velocity minus 10% is used to calculate the final 1% sediment thickness.* (1 page- provided in hard copy and digitally on 28 August 2006).

Annex II
Questions posed by the Subcommission to the Irish Delegation.

06.09.2005	Question 1. Discrepancies between electronic and hard copy of the Submission As there appears to be an inconsistency in longitude values relating to baseline points contained in the hard-copy of the Submission and those in its GIS version, the Subcommission kindly requests the Delegation of Ireland to verify the longitude values of the base points, in particular points # 15, 17, 32, 33 provided in table 3.2 (page 12 of Part III – Delineation of the Irish Continental Shelf).
06.09.2005	Question 2 Points of the foot of the continental slope The Subcommission kindly requests the Delegation of Ireland to indicate which of the foot of the continental slope points described, have actually been used for the purpose of delineating the outer limits. The Subcommission also kindly requests the Delegation to specify: (i) which outer limit points are generated by the corresponding foot of the continental slope points; (ii) which criterion has been applied in the determination of each foot of the continental slope point.
06.09.2005	Question 3 Manually calculated coordinates for the outer limits of Irish continental shelf The Subcommission kindly requests the Delegation of Ireland to provide clarifications concerning the nature of the change to the coordinates, transmitted by the Delegation on 1 September 2005, in particular with regard to the coordinates of ID 11-16. In addition, the Subcommission is seeking clarifications on coordinates of ID 11-32 contained in the executive summary of the Submission, vis-à-vis the newly submitted coordinates.
06.09.2005	Question 4 Clarifications concerning maps Ireland has submitted a number of figures and maps illustrating the various lines and fixed points that delineate the outer limit and associated tables providing information on the outer limit fixed points. Such figures, maps and tables include Figure 1.4 and Appendix 1.1 of the document "executive summary" (Part I); Figure 3.72 of the document "Delineation of the Irish Continental Shelf" (Part III); enclosure "Map_Ireland_Outer_CS_Limits" provided (as hard copy and in pdf format) in "Supplementary Information" (Part IV); and Figures 1 and 2, and the associated table, attached to the letter dated 1 September 2005. In order to prevent any misunderstanding between the Subcommission and the Delegation of Ireland about the exact form of the outer limit that Ireland has submitted, the Subcommission kindly requests the Delegation to provide two new outer limit maps showing, respectively, the original outer limit contained in the executive summary as derived using CARIS LOTS and the manually calculated outer limit attached to the letter of 1 September 2005. Each map should contain the following: • Numbered outer limit fixed points; • Numbered foot of the continental slope points; • Article 76 criterion on which each point is established; • Straight lines connecting the fixed points; • Distance between each pair of outer limit points.

06.09.2005	Question 5 Seismic data files The Subcommission kindly requests the Delegation of Ireland to provide it with the relevant seismic data in digital format, either in .pdf or .jpg.
07.09.2005	Question 6 1 per cent sediment thickness points In Part III ("Delineation of the Irish Continental Shelf") of its partial Submission, Ireland states that "The interval velocity minus 10% was chosen as the more conservative estimate for the sediment thickness" (page 130). Ireland appears to use this approach in determining the two 1 per cent sediment thickness points that contribute to its outer limit line at SPN4785 on PAD95-12 (page 132) and SPN11725 on PAD95-13 (page 134). However, in Table 3.11 of Part III of the Submission, the sediment thicknesses derived using the mean interval velocity minus 10% at each of these shot points do not appear to meet the sediment thickness criteria as set out in paragraph 4(a)(i) of article 76 of UNCLOS; that is, "the thickness of sediment is at least 1% of the shortest distance from such point to the foot of the continental slope." The Subcommission kindly requests the Delegation of Ireland to clarify the methodology it has used in determining the location of the two 1 per cent sediment thickness points that are relevant to its Submission, and to verify that these two points satisfy the relevant provisions of article 76.
07.09.2005	Question 7 Determination of the foot of the continental slope The Subcommission kindly requests the Delegation of Ireland to confirm that the process of determination of the foot of the continental slope that it applied consisted of a two-part process as follows: - definition of the base of the slope zone using both morphology and geophysics; - definition of the foot of the continental slope within the base of the slope zone, using the maximum change in gradient determined by the CARIS Lots application; The Subcommission would like to also receive formal confirmation from the Delegation that in no case the foot of the continental slope, in the area adjacent to the Porcupine Abyssal Plain relevant to the Submission, was determined by applying the evidence to the contrary criterion.
07.09.2005	Question 8 Longitude and latitude values of foot of the continental points As a follow up to question 3, the Subcommission kindly requests the Delegation to add two columns to the table included in the letter dated 1 September 2005 transmitting the manually calculated coordinates for the outer limits of the Irish continental Shelf. These columns should specify the latitude and longitude values of the foot of the continental slope point that has been utilised to generate each outer limit point contained in the table.
08.09.2005	Question 9 Foot of the continental slope points in the Porcupine Bank and Northern Goban Spur areas The Subcommission feels that for foot of continental slope (FOS) points FOS 50, FOS 51 and FOS 53, in the Porcupine Bank area, critical to the delineation of the outer limit of the extended continental shelf proposed by Ireland, there may be alternative, more landward, FOS locations based on an examination of seismic line PAD95-13 that appears to be representative of this portion of the margin. Similarly, for foot of continental slope point FOS 57, in the Northern Goban Spur area, also critical to the outer limit, there may be an alternative, more landward, FOS location based on an examination of seismic lines PAD95-15 and WI-23 that appear to be representative of this portion of the margin.

	The Subcommission kindly requests the Delegation of Ireland to provide detailed clarification of its reasoning behind the selection of these FOS points, and any further information that it may have used to substantiate the FOS locations.
08.09.2005	Question 10 Seismic and seismic velocity data used in the determination of the 1 per cent sediment thickness points The Subcommission kindly requests the Delegation of Ireland to provide the following information to allow it to verify the determination of the two 1 per cent sediment thickness points that are relevant to the Submission of Ireland. *10a. Seismic data (Guidelines para. 9.3.6)* Uninterpreted copies of the seismic lines are needed, together with the interpretation of the same lines, in order for the Subcommission to observe the details of the interpretation. Although Ireland has provided both uninterpreted (1:100,000 scale) and interpreted (1:200,000 scale) seismic profiles (Appendices 3.5 and Appendix 3.9 of the Submission, respectively), it would aid the Subcommission's work if it also had details of both uninterpreted and interpreted seismic profiles over the part of the seismic line in the vicinity of each of the 1 per cent sediment thickness points. *10b. Seismic velocity data used in the depth conversion (Guidelines para. 9.3.8)* The actual velocity analysis from the processing job should be submitted at least for the part of the line where it crosses the fixed points. *10c. Range of error in the velocity analyses/velocity picks used in the depth conversion (Guidelines para. 8.3.11)* Comment or information on the relative range of error inherent in the velocity analysis/velocity picks used by Ireland in the depth conversions associated with each sediment thickness point. The Subcommission notes that there is a considerable variation of the derived interval velocity of the sedimentary section at each of the velocity analysis locations around the 1 per cent sediment thickness points located on seismic lines PAD95-12 and PAD95-13 as indicated in Table 3.11 of Part III of the Submission of Ireland. On seismic line PAD95-12 the interval velocity of the sediment at the four velocity analysis locations provided varies from 2396.62 m/s at SPN 4852 to 3060.61 m/s at SPN 4798 (see p.131-132, Table 3.11, Part III of Submission). On seismic line PAD95-13 the interval velocity of the sediment at the four velocity analysis locations provided varies from 2773.09 m/s at SPN11758 to 3408.89 m/s at SPN 11597 (see p.133-134, Table 3.11, Part III of Submission).
08.09.2005	Question 11 Detailed geological (structural) map The Subcommission kindly requests the Delegation of Ireland to provide a more detailed geological (structural) map of the area abutting the Porcupine Abyssal Plain in order to aid its understanding of Part III ("Geology and Geomorphology of Ireland and its Continental Shelf") of the Submission.
09.09.2005	Question 12 General location of the base of the slope zone Following up on the presentation on geomorphometrics made by Mr. Fernando Pimentel, an Expert to the Subcommission, the Subcommission kindly seeks further clarifications and more detailed supporting data and information regarding the general location of the base of the slope zone, as reflected in Question 9 for specific FOS locations.

09.09.2005	Question 13 Updated GIS Following up on the letter by the Delegation of Ireland dated 1 September 2005 transmitting the manually calculated coordinates for the outer limits of the Irish continental shelf, the Subcommission kindly requests the Delegation of Ireland to provide an updated GIS database reflecting the newly-submitted coordinates.
24.01.2006	Question 16 Character of the continental slope ***General clarifications*** It appears from your presentation of 23 January 2006 and from your selection of some FOS points that you base your calculations on a two-segment structure of the continental slope: lower slope and upper slope with a clear boundary between them expressed as a change in gradient, which sometimes is greater than that at the foot of the slope. Generally, a two-segment structure is not considered typical for most of the passive margins of the Atlantic Ocean. 16.1 Could you indicate the areas of the region (inside and outside the Submission area) for which such two-segment structure of the slope is typical? 16.2 Do you have any other evidence (geophysical, geological) that the boundary between the two segments is actually within the slope rather than at the foot of the slope? 16.3 Do you have any evidence that the parts of the rise shown on your lines actually belong to the rise and not to the deep ocean floor? Do you have any morphological data which allow definition of the seaward edge of the rise? 16.4 What criteria (supporting geological/geophysical information or evidence to the contrary) are used to differentiate the lower slope from the rise? ***More specific questions concerning the character of the continental slope*** 16.5 From an extension of the profile defining FOS 53, it appears as if the chosen point is at the boundary with the deep ocean floor. Can you supply the necessary data (seismic or otherwise) to show that there is a rise immediately after the point chosen as FOS 53? 16.6 The Delegation of Ireland has provided information on the nature of the slope/rise transition along the continental margin in the Porcupine Bank area in Part III of its Submission, and in later documents such as IRL-LETT-03-09_Sept_2005.DOC and IRL-DOC-08-17_Oct_2005. In Fig. 1 of document IRL-DOC-08-17_Oct_2005 Ireland refers to the Porcupine Bank and North Goban Spur areas as having only one base of slope region, where as in other areas there are two-segment slopes - an upper segment with a generally steeper gradient, and a lower segment with a generally lower gradient. Several questions/comments arise from this: (i) In Ireland's description of the bathymetric profile through FOS 50 on the Porcupine Bank margin in document IRL-DOC-08-17_Oct_2005, described as a type 1 margin (Fig. 1), upper and lower slope segments are mentioned. Is this therefore an area with one potential base of slope zone or two? (ii) The two slope segments mentioned for the profile through FOS 50 are marked by an interpreted headwall scar at the landward edge, and the toe of a slump/slide complex at the seaward edge, with an average gradient of about 1.6° between them, but with local gradients up to greater than 4°. The "lower slope" segment is related to the slide complex. Can the Delegation of Ireland provide the Subcommission with any further information or argument as to why the slump/slide process of the lower slope segment are related to the slope rather than to the rise, or to both the slope and rise? (iii) FOS 48, 49 and 50 on the Porcupine Bank margin are located consistently at the base of the "lower slope" segment, which has average gradients of about 1.2-1.6°; however, FOS

	51 is located within a "lower slope" segment with an average gradient of about 1.9°. Can the Delegation of Ireland explain this apparent inconsistency in the form of the FOS along the same part of the margin? 16.7 In document IRL-DOC-08-17_Oct_2005, the "declivity of the lower slope" is said to be 4° based on the slope information provide in Appendix 3.8, FOS57_DP_ED, and it is argued that this is "too steep for a continental rise". Can the Delegation please verify this information, as FOS57_DP_ED appears to show a gradient of 2.8° for this "lower slope" segment and the Subcommission measures an average gradient of about 1.8°.
24.01.2006	Question 17 Content of presentation made by the Irish Delegation on 23 January 2006 The first part of the introduction by the Head of the Delegation of Ireland was a re-iteration of the presentation made at the 16th Session. Was there anything in particular in this presentation that the Delegation of Ireland wished to draw to the attention of the Subcommission?
24.01.2006	Question 18 Kimbell study Is the Report by Kimbell et al., commissioned by the British Geological Survey, to be made available to the Subcommission, also available in the public domain?
24.01.2006	Question 19 Seismic profiles labelling Could the seismic profiles presented be labelled in terms of which FOS points they support?
25.01.2006	Question 20 Character of the continental slope in the "Mouth of the Rockall trough" area The Subcommission recognises that FOS 46 is the only FOS point within the partial Submission of Ireland that relates to the mouth of the Rockall Trough, and that its examination of this FOS point is dependant on an understanding of the character of the continental margin associated with the southern part of the trough. To assist this understanding, the Subcommission kindly requests the Delegation of Ireland to provide it with further seismic data in the area, particularly profiles PAD95-11 and 11B, and PAD95-10 and 10B, in addition to seismic profiles PAD95-12 and CM-04 already supplied. The Subcommission would appreciate it if the Delegation could provide these seismic profiles in both hardcopy and electronic form (SEG-Y and pdf), as it has done for other seismic data.
25.01.2006	Question 21 Comparison of interval velocities derived from CDP stacking velocities and DSDP drill holes As part of its response to Question 10c, the Delegation of Ireland provided comparative velocity information for DSDP Site 610 and seismic profile PAD95-09 from the southeastern flank of the Rockall Plateau. The Subcommission kindly requests the Delegation to provide similar information for other DSDP sites in the area covered by the partial Submission, particularly those on the southwest flank of the Goban Spur as follows: - DSDP Site 548 associated with seismic line CM-18A - DSDP Site 549 associated with seismic lines WAM3 and 4A, and CM-10 - DSDP Site 551 associated with seismic linesWAM3 and CM-10 - DSDP Site 550 associated with seismic lines CM-11 and PAD95-16

	This information will aid the Subcommission in its verification of stacking velocity-derived interval velocities throughout the area, and in particular its examination of 1 per cent sediment thickness points FP1 and FP2.
25.01.2006	Question 22 Clarification of response to Question 10b In its response to Question 10b in document IRL-DOC-09-17_Oct_2005 the Delegation of Ireland referred to two other previous responses in documents IRL-DOC-07-09_Sept_2005 and IRL-DOC-08-17_Oct_2005. The latter document relates to methodologies for identifying foot of slope points, and appears to have little relevance to a discussion of interval velocity determination. Therefore, in an effort to maintain an accurate record of interactions the Subcommission kindly requests the Delegation to verify which document they are referring to here.
26.01.2006	Question 23 1 per cent sediment thickness formula points and outer limit fixed points FP1 and FP2 In Question 6 of 7 September 2005, the Subcommission referred to the two 1 per cent sediment thickness points at SPN4785 on PAD95-12 and SPN11725 on PAD95-13 that define outer limit fixed points FP1 and FP2 of the partial Submission of Ireland, and requested the Delegation of Ireland "to verify that these two points satisfy the relevant provisions of article 76". In its response (IRL-LETT-02-08_Sept_2005), the Delegation recognised that the sediment thickness at these two points was 7.02 m (PAD95-12) and 5.54 m (PAD95-13) less than that required to meet the criterion as set out in paragraph 4(a)(i) of article 76 of UNCLOS, according to which "the thickness of sediment is at least 1 per cent of the shortest distance from such point to the foot of the continental slope." In this connection, the Delegation argued that: "These distances were considered small enough within the very generous assigned error margin of minus 10% to allow them for selection as the fixed points at each of which the thickness of the sedimentary rocks is at least 1% of the shortest distance from such point to the foot of the continental slope." The Subcommission has carefully considered this response and is of the view that, despite the methodology used by Ireland to determine the sediment thickness, once the thickness is derived and applied it should fully comply with the wording of paragraph 4(a)(i) of article 76. This means that the locations of outer limit fixed points FP 1 and FP 2 and associated sediment thickness points will need to be re-computed to ensure full compliance with article 76. The present question should in no way be construed as implying that, at this stage, the Subcommission has concluded its examination of related Foot of the Slope points 46 and 50.
11.04.2006	Question 24 Table summarising the FOS points selected, the criterion invoked and the fixed points generated Based on the presentation made on 10 April 2006, the Subcommission kindly requests the Delegation of Ireland to provide it with a table summarising the current foot of continental slope information that is critical to the outer limit contained in the partial Submission of Ireland. The table should consist of seven columns containing information in the following order: i. FOS number; ii. FOS Latitude; iii. FOS Longitude; iv. Article 76(4)(b) criterion invoked (maximum change in the gradient or evidence to the contrary); v. Outer limit Fixed Points generated from each FOS; vi. Supporting or reference documents relating to the article 76(4)(b) criterion invoked (e.g. IRL-DOC-11-10_Apr_2006);

	vii.Remarks relating to each FOS (if any, e.g. relevant seismic lines).
11.04.2006	Question 25 Additional seismic or other data required to support FOS 53 per se and FOS 57 During the presentation made on 10 April 2006, the seismic profiles relating to FOS 48, 49, 50, 51, 52, 53-54, 54, 58, 59 were highlighted, but the Delegation of Ireland was silent with respect to any such seismic profiles relevant to FOS 53 per se, and FOS 57. The Subcommission kindly requests the Delegation of Ireland to confirm that it has no additional seismic or other data, information, or further clarifications specific to FOS 53 per se and FOS 57, as per paragraph 6.4 of the CLCS Scientific and Technical Guidelines; however, should such additional data, information or clarifications be available, the Subcommission kindly requests to be provided with it.

Annex III

Answers and documents provided by the Irish Delegation in response to the questions posed by the Subcommission.

PERMANENT MISSION OF
IRELAND TO THE UNITED NATIONS
1 DAG HAMMARSKJÖLD PLAZA
885 SECOND AVENUE, 19TH FLOOR
NEW YORK, NY 10017

TELEPHONE (212) 421-6934
FAX (212) 752-4726

7 September 2005

Ref: IRL-LETT-01-07_Sept_2005

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman

I refer to the meeting yesterday between the Delegation of Ireland and the Subcommission for the consideration of the Submission made by Ireland and, in particular, to the Questions posed by the Subcommission during the course of that meeting.

The Delegation of Ireland wishes to respond to these Questions as follows:

Q.1 Discrepancies between electronic and hard copy of the Submission

We have referred the identified discrepancies in longitude values for baseline points to Dublin and expect to be able to confirm the correct values to the Subcommission shortly.

Q.2 Points of the Foot of the Continental Slope

Attached to this letter are revised tables setting out the co-ordinates of the fixed points used to define the proposed outer limits of the extended shelf in the area abutting the Porcupine Abyssal Plain. The first table sets out the fixed points (referred to as "ID" points) determined using the CARIS LOTS automated solution (IRL-DOC-01-07_Sept_2005 – "Co-ordinates of Fixed Points used to define the Outer Limits of the Extended Shelf in the area abutting the Porcupine Abyssal Plain as determined by CARIS LOTS automated solution"). This table originally appeared as Appendix 1.1 of the Executive Summary of the Submission of Ireland.

The second table sets out the fixed points (now referred to as "FP" points) subsequently plotted by the CARIS LOTS tool and then selected manually (IRL-DOC-02-07_Sept_2005 – "Co-ordinates of Fixed Points used to define the Outer Limits of the Extended Shelf in the area abutting the Porcupine Abyssal Plain as plotted by CARIS LOTS and then selected manually").

Where there is no change in the fixed point (FP) so selected the corresponding ID point is indicated.

In order to address the specific requirements of the Subcommission as set out in Q. 2, two additional columns have been inserted in the tables. The column entitled "Corresponding FOS" indicates the Foot of Slope Point from which the relevant Fixed Point has been generated. The column entitled "Base of Slope Region" indicates the Base of Slope Region in which a given Foot of Slope Point is to be found. Enclosed also please find as requested a map on which is marked the different Base of Slope regions (IRL-MAP-01-07_Sept_2005).

We would also like formally to confirm that all Foot of Slope points used in the preparation of the Submission of Ireland have been chosen using the maximum change of gradient criterion. "Evidence to the contrary" has not been used in selecting any chosen Foot of Slope point.

Q.3 Manually calculated co-ordinates for the outer limit of the Irish continental shelf

The CARIS LOTS tool was asked to plot fixed points at one nautical mile intervals on each arc of circle of radius 60 nautical miles drawn from the foot of slope points. As may be seen from the tables referred to above, the CARIS LOTS automated solution identified 39 optimum fixed points (ID No.s 1-39) from 15 Foot of Slope points. However when the selection of such points was carried manually 23 were identified (FP No.s 1-23) from the same 15 Foot of Slope points. The straight lines connecting these 23 points enclose a larger area than that enclosed by straight lines drawn to connect the 39 ID points.

In both exercises the ID and FP points are often the same points, namely ID No.s 1–10 correspond to FP No.s 1-10 and ID No.s 33–39 correspond to FP No.s 17-23. However the manual exercise reveals that straight lines not exceeding 60 nautical miles in length drawn to connect FP points No.s 11-16 enclose a larger area than would be the case were similar straight lines drawn to connect ID points No.s 11-32, as suggested by the CARIS LOTS automated solution. Ireland has therefore elected to favour FP No.s 11-16 and to discard ID No.s 11-32.

Q. 4 Clarifications concerning maps

Two new maps have now been prepared as requested and I would propose that these be projected at our next meeting for inspection and comment by members of the Subcommission. We will then arrange to have them printed and submitted formally.

Q. 5 Seismic data files

As we indicated yesterday, upon return to Dublin we will arrange for the relevant seismic data to be transmitted to the Subcommission in digital format as requested for examination by members intersessionally.

In addition to the foregoing the Delegation of Ireland encloses herewith two documents originally circulated yesterday, namely:

- IRL-DOC-03-07_Sept_2005 –"Outer Limit Generation in CARIS LOTS"; and
- IRL-DOC-04-07_Sept_2005 – "Generation of Profiles".

We trust that this information will be of assistance to the Subcommission in its consideration of the Submission of Ireland.

Yours sincerely

Declan Smyth
Head of Delegation

Encl.../

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1 DAG HAMMARSKJÖLD PLAZA
885 SECOND AVENUE, 19TH FLOOR
NEW YORK, NY 10017

TELEPHONE: (212) 421-6934
FAX: (212) 752-4726

8 September 2005

Ref: IRL-LETT-02-08_Sept_2005

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman

I refer to the meeting yesterday between the Delegation of Ireland and the Subcommission for the consideration of the Submission made by Ireland and, in particular, to the Questions posed by the Subcommission during the course of that meeting.

The Delegation of Ireland wishes to respond to these Questions as follows:

Q. 6 <u>1% sediment thickness points</u>

The methodology used in determining the fixed points at each of which the thickness of the sedimentary rocks is at least 1% of the shortest distance from such points to the foot of the continental slope is outlined in detail in Part III, Section 3.3.4 of Ireland's Submission. This methodology is summarized below:

- Seafloor and the top basement horizons were interpreted using Landmark Seisworks software on a Sun workstation.
- A continuous sedimentary apron was determined to exist along the entire length of the continental margin for this partial Submission.
- Interval velocities were derived from the seismic stacking velocities using the Dix equation. The average velocity and the depth were also calculated.
- PAD95-12, PAD95-13 and PAD95-15 all contain in excess of 1% sediment thickness at the Foot of Slope + 60M limit.

- Three points were identified on PAD95-12 (SPN 4822), PAD95-13 (SPN 11668) and PAD95-15 (SPN 653) that had 1% sediment thickness.
- An estimate of error was achieved by taking the calculated interval velocity for the sediment cover for the four closest CDPs averaged and plus or minus 10%.
- The interval velocity minus 10% was chosen as the more conservative estimate for the sediment thickness. This pushed back the 1% sediment thickness point on all lines.
- Only PAD95-12 and PAD95-13 contain 1% sediment thickness beyond the Foot of Slope + 60M limit within the -10% error range.
- SPN4785 on PAD95-12 and SPN11725 on PAD95-13 were the final 1% sediment thickness points.

The points analysed for error estimates were spaced at every five shot points. The distance between five shot points is approximately 185m. Given the inherent uncertainty in such an analysis and the overall effect of these uncertainties on the Submission area as a whole, the shot point selected was the one that most closely approximated the fixed points at each of which the thickness of the sedimentary rocks is at least 1% of the shortest distance from such point to the foot of the continental slope.

From the table shown below it can be seen that the shot points located seaward of the selected shot point are 31.7m less than the 1% thickness for PAD95-12 SPN 4790 and 33.51m less than the 1% thickness for PAD95-13 SPN 11720. The two landward shot points are 31.27m greater than the 1% thickness for PAD95-12 SPN 4780 and 19.01m greater than the 1% thickness for PAD95-13 SPN 11730. For the shot points chosen as the fixed points at each of which the thickness of the sedimentary rocks is at least 1% of the shortest distance from such point to the foot of the continental slope – PAD95-12 SPN 4785 was 7.02m less than 1% sediment thickness and PAD95-13 SPN 11725 was a mere 5.54m less than 1% sediment thickness.

LINE	SPN	Mean 1% Thickness (m)	+10% error (m)	-10% error (m)	Distance to Foot of Slope	Difference (m)
PAD95-12	4780	1358	1494	1221.96	119069	31.27
PAD95-12	4785	1317	1449	1185.54	119256	-7.02
PAD95-12	4790	1292	1421	1162.72	119442	-31.7
PAD95-13	11720	1229	1352	1105.86	113937	-33.51
PAD95-13	11725	1258	1384	1132	113754	-5.54
PAD95-13	11730	1283	1411	1154.73	113572	19.01

Seismic lines and shot point numbers used in determining the fixed points at each of which the thickness of the sedimentary rocks is at least 1% of the shortest distance from such point to the foot of the continental slope. The last column shows the difference (in metres) between the point selected and the true 1% thickness value.

These distances were considered small enough within the very generous assigned error margin of minus 10% to allow them for selection as the fixed points at each of which the thickness of the sedimentary rocks is at least 1% of the shortest distance from such point to the foot of the continental slope.

Q.7 Determination of the foot of the continental slope

The Commission sets out in CLCS Guideline 5.1.3 "the identification of the region (emphasis added) defined as the base of the continental slope".

The CLCS Guidelines (5.4.4) defines the continental slope as "the outer portion of the margin that extends from the shelf edge to the upper part of the rise, or to the deep ocean floor where a rise is not developed". The rise is "the wedge shaped sedimentary body having a smaller gradient than the continental slope".

We wish now formally to confirm that, as per CLCS Guideline 5.4.6, the Base of Slope region was first determined for the purposes of the Irish Submission on the basis of morphological and bathymetric evidence. The procedure in establishing the base of slope region is outlined in CLCS Guidelines (5.4.5) and involves a two-step methodology. Firstly, the outer (seaward) line was identified by moving from the outer region of the continental rise (or deep ocean floor where a rise is not developed) landward. This line was fixed at the most seaward possible approximate pick for the foot of the continental slope. Secondly the inner (landward) line was identified by moving from the lower part of the continental slope toward the continental rise (or the deep ocean floor where a rise is not developed). Review of Part III of the Irish Submission reveals that the term "continental shelf edge" appears instead of "continental rise, or the deep ocean floor where a rise is not developed" (page 80, line 7). This was an oversight in the drafting of the document and does not represent the methodology used to determine the base of slope regions identified on the basis of morphology. The base of slope regions identified on the basis of morphology in the Irish Submission were the Porcupine Bank and the Northern Goban Spur (see IRL-MAP-01-07_Sept_2005).

Within the area that is the subject of the present Submission there are a number of regions along the Irish continental margin where the morphological and bathymetric techniques described in CLCS Guidelines 5.4.5 do not adequately define the base of the continental slope. This is because the nature of the underlying crustal type (i.e. oceanic or continental) is not represented, or is misrepresented, by the bathymetric data. These regions depart from the "ideal picture" referred to in the CLCS Guidelines at para. 5.4.4. For these regions para. 5.4.4 allows for the use of geological and geophysical evidence to assist in identifying the base of the continental slope. For this Submission, three regions are identified as departing from the "ideal picture" of the continental margin. Seismic data is principally used to assist in identifying the base of the continental slope supplemented by magnetic and gravity data. These three Base of Slope regions are: the Mouth of the

Rockall Trough, the Gollum Channel Region and the Western Edge of the Goban Spur (see IRL-MAP-01-07_Sept_2005). The presentation and interpretation of geophysical evidence used to define these base of slope regions are outlined in Part III, sections 3.3.2.1 to 3.3.2.3.

As we confirmed yesterday in our letter IRL-LET-01-07_Serpt_2005, the foot of the continental slope point was established by reference to the maximum change in gradient within the base of slope regions (themselves defined on the basis of both morphology and geophysics). At no point was "evidence to the contrary" invoked to establish the foot of the continental slope.

Q.8 Longitude and Latitude values of foot of slope (FOS) points

As indicated at yesterday's meeting the tables IRL-DOC-01-07_Sept_2005 and IRL-DOC-02-07_Sept_2005 do not appear amenable to the inclusion of two new columns setting out co-ordinates of latitude and longitude of the 15 foot of slope (FOS) points. This is because only a minority of foot of slope points are actually used in generating fixed points and only these FOS points are referred to in the two tables. We have therefore prepared a new table setting out the co-ordinates of all 15 FOS points together with the details of any fixed points derived from them, either by automated solution (ID points) or manually (FP points), where relevant (document IRL-DOC-05-08_Sept_2005).

As we indicated at our meeting yesterday we hoped to be in a position to reply to Q. 1 posed by the Subcommission at our meeting on 6 September and I am happy to be in a position to do so now.

Q. 1 Discrepancies between electronic and hard copy of the submission

The discrepancies identified by the Subcommission between longitude values set out in Table 3.2 of Part III of the Submission and the GIS information subsequently submitted appears to have resulted from an input error in the conversion calculation. Essentially, it has been discovered that in converting the four 1959 base point longitude values for the WGS84 datum identified by the Subcommission, in each case the longitude value for the following base point was mistakenly used, i.e. in converting the value for base point 15, the 1959 longitude value for point 17 was inadvertently used.

Table 3.2 has now been re-examined and a revised version of it is appended herewith (IRL-DOC-06-08_Sept_2005).

As regards the baselines generally we would like to recall that Ireland's straight baselines were established by Government order in 1959 following the judgment in the Anglo-Norwegian Fisheries case at the International Court of Justice in 1951 and the subsequent codification of international law with regard to straight baselines achieved by the 1958 Territorial Seas

Convention. Following the recent repeal and replacement of the Norwegian straight baselines regulations of 1935 and 1952, we understand that Irish straight baselines are now the oldest extant straight baselines in the world.

As we indicate in Part III of the Submission British Admiralty charts were used during the late 1950s to establish the base points from which straight baselines are drawn. These points are prescribed by the Maritime Jurisdiction Act, 1959 (Straight Baselines) Order, 1959 and are identified therein by reference to co-ordinates of longitude and latitude. However no datum was specified in the 1959 Order.

The co-ordinates prescribed in the Order are accurate to one tenth of a minute, i.e. to approximately ± 93m. This in turn means that each set of co-ordinates essentially describes a circular area of 26,938 m². Modern survey technologies have a much greater precision than the charts used for the definition of the base points in 1959. However for the purposes of the present Submission, and in particular the measurement of 200 and 350 nautical mile limits drawn from baselines, the selection of one datum over another for conversion of the 1959 base point values for GIS calculations is largely academic as the divergence between values for different datums will fall within the margin of imprecision (± 185m) of the original base point values.

In any event, regardless of how the 200 nautical mile limit is measured in the case of the present Submission (i.e. whether from straight baselines calculated on various different datums or from the normal baseline (i.e. the low-water line along the coast)), in all cases the fixed points from which straight lines are drawn to delineate the proposed outer limit of the extended continental shelf lie beyond that limit, and natural prolongation must therefore be established.

We trust that this information will be of assistance to the Subcommission in its consideration of the Submission of Ireland.

Yours sincerely

Declan Smyth
Head of Delegation

Encl.../

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IRELAND TO THE UNITED NATIONS
1 DAG HAMMARSKJÖLD PLAZA
885 SECOND AVENUE, 19TH FLOOR
NEW YORK, NY 10017

TELEPHONE (212) 421-6934
FAX: (212) 752-4726

September 2005

Ref: IRL-LETT-03-09_Sept_2005

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
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Dear Chairman

I refer to the meeting yesterday between the Delegation of Ireland and the Subcommission for the consideration of the Submission made by Ireland and, in particular, to the Questions posed by the Subcommission during the course of that meeting.

The Delegation of Ireland wishes to respond to these Questions as follows:

Q. 9 Foot of the continental slope points in the Porcupine Bank and Northern Goban Spur areas

(i) FOS 50

This foot of slope profile is coincident with PAD95-13. The base of slope region, defined on the basis of morphology, is located between the end of the steep slope of the Porcupine Bank and the lower part of the continental rise.

This profile shows the gentler sloping area located at the lower end of the steeper slope (marked A in Figure 1). It is Ireland's interpretation that the gentler sloping area is part of the continental slope and is the result of significant continental margin slope failure or slide processes. This is supported by a number of lines of evidence:

- A separate continental rise is developed seaward of this feature (marked B on Figure 1). The automatic maximum change in gradient tool in CARIS LOTS identifies the bottom of the continental rise.

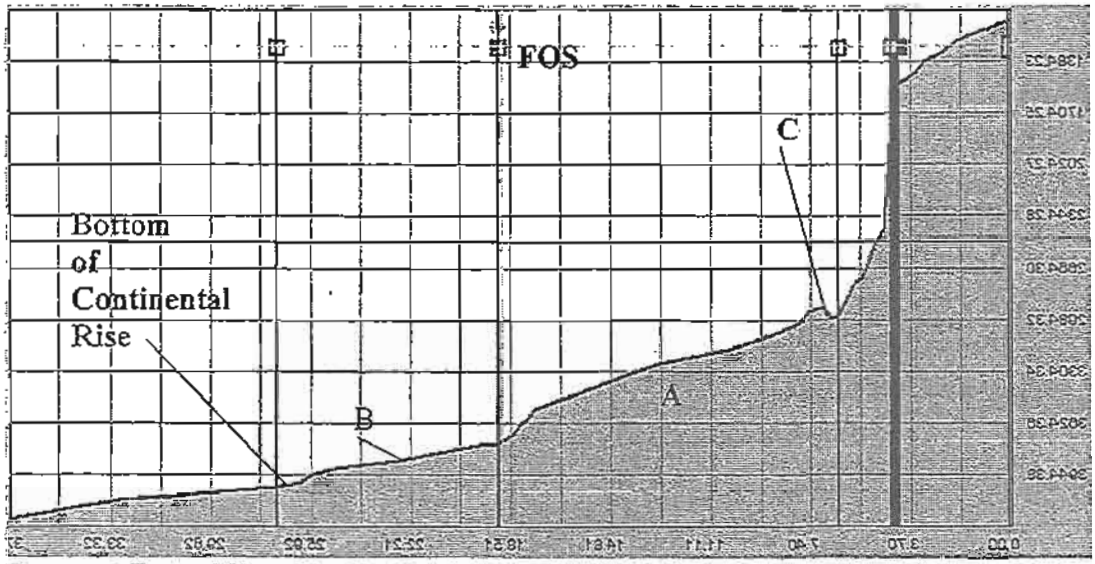


Figure 1: Foot of Slope Profile 50 with the CARIS LOTS automatically generated potential picks. Features pointed out in image are referred to in text.

- The "toe" of the slide feature is abrupt which suggests that it was formed by a single catastrophic failure along the margin and that the material slid down-slope in one event.

- A pronounced headwall scar (marked C on Figure 1) is developed at the lower end of the steeper part of the slope. This feature may be considered a local maximum (as defined by CLCS Guidelines 5.4.12) and can therefore be excluded as a potential foot of slope selection. In absence of this feature, the automatically generated CARIS LOTS foot of slope picks would only occur at the position actually selected by Ireland, the pick at the bottom of the rise and those further up slope.

- Interpretation of the seismic data reveals a history of slope failures in the area (Figure 2 below).

NOTE: While geophysics assisted in this interpretation, it should be noted that the base of slope region was defined on the basis of morphology and the FOS point was selected on the basis of maximum change in gradient at the base of the slope.

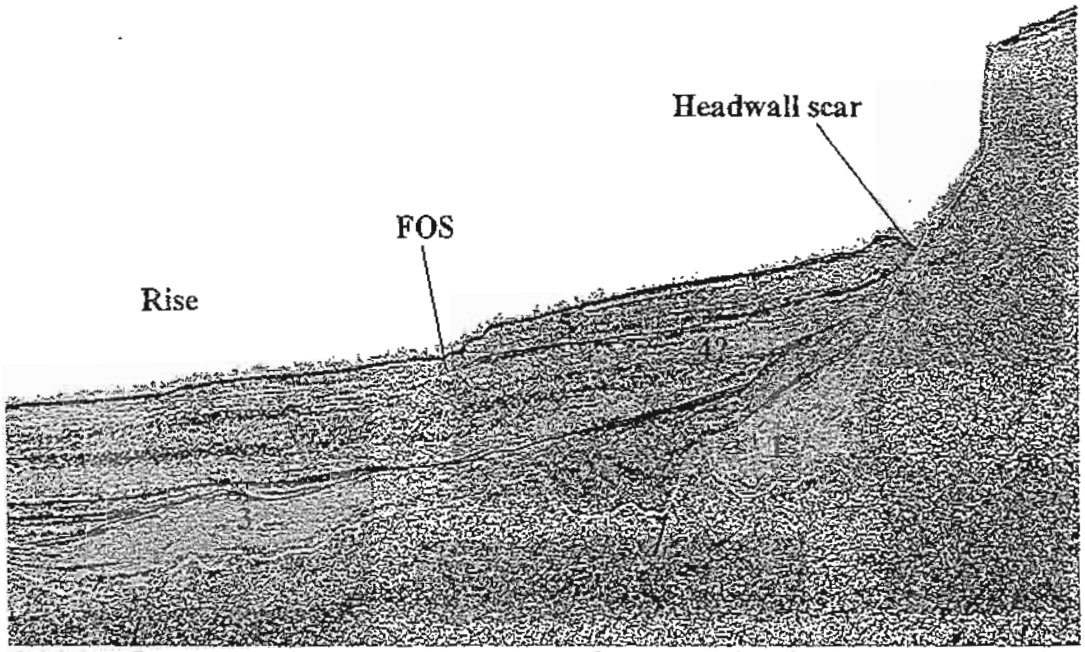


Figure 2: Interpreted seismic section showing the result of multiple slope failures located along the base of the Porcupine Bank.

(ii) FOS 51

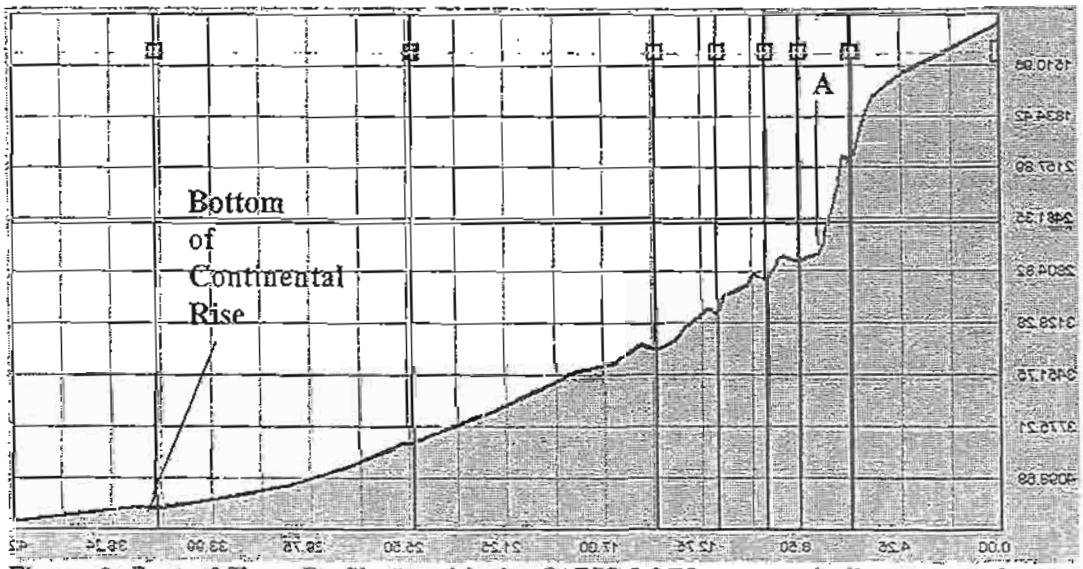


Figure 3: Foot of Slope Profile 51 with the CARIS LOTS automatically generated potential picks. Features pointed out in image are referred to in text.

FOS 51 occurs approximately 16.5M south of FOS50. The features on this profile are directly related to those described for FOS50.

The headwall scar is again very well developed (marked A on figure 3). A series of hummock-like features is seen on the profile and these are interpreted to be the result of slope failure, with large blocks of sedimentary material having failed and slid down-slope in a seaward direction.

We interpret the outermost automatically generated FOS pick to be the bottom of the continental rise. We have therefore chosen the automatically generated FOS pick at the top of the rise as our Foot of Slope point. Another reason for choosing this point is to remain consistent with the FOS point chosen on the FOS50 profile.

NOTE: As with FOS 50, it should be noted that the base of slope region was defined on the basis of morphology and FOS 51 was selected on the basis of maximum change in gradient at the base of the slope.

(iii) FOS 53

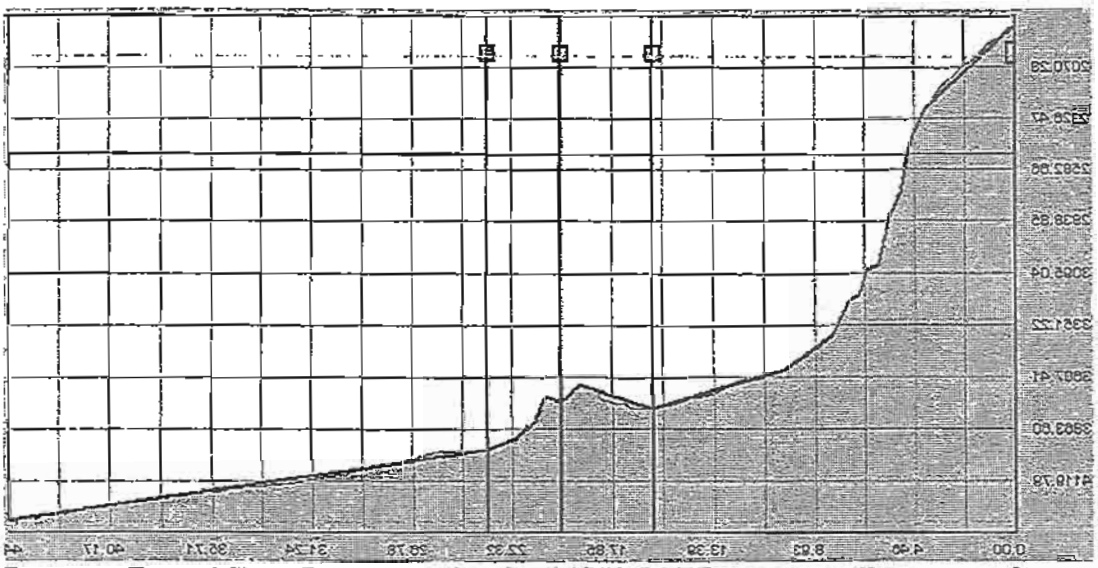


Figure 4: Foot of Slope Profile 53 with the CARIS LOTS automatically generated potential picks.

With regard to FOS 53 either of two interpretations of the FOS profile support the selection made. However, it should first be noted that, on the basis of the CARIS LOTS automatically generated FOS potential picks, only three such picks are suggested and only one of these meets the criteria in Article 76 and the CLCS Guidelines (i.e. the FOS point selected (a) occurs at the maximum change in gradient (b) at the base of the continental slope). The two landward picks do not meet these criteria.

The first interpretation of the profile is that the mound feature at which the FOS point is located is related to the slope failure described for FOS 50 and

51. The second interpretation of the profile is that the mound feature at which the FOS point is located is a continuation of the basement high that runs across the outer part of the Gollum Channel region (for details, see Part III, Section 3.3.2.2). No change in gradient associated with the continental rise (if developed) was detected by the CARIS LOTS software.

NOTE: As with the previous two profiles it should be noted that the base of slope region was defined on the basis of morphology and the FOS53 point was selected on the basis of maximum change in gradient at the base of the slope.

(iv) FOS 57

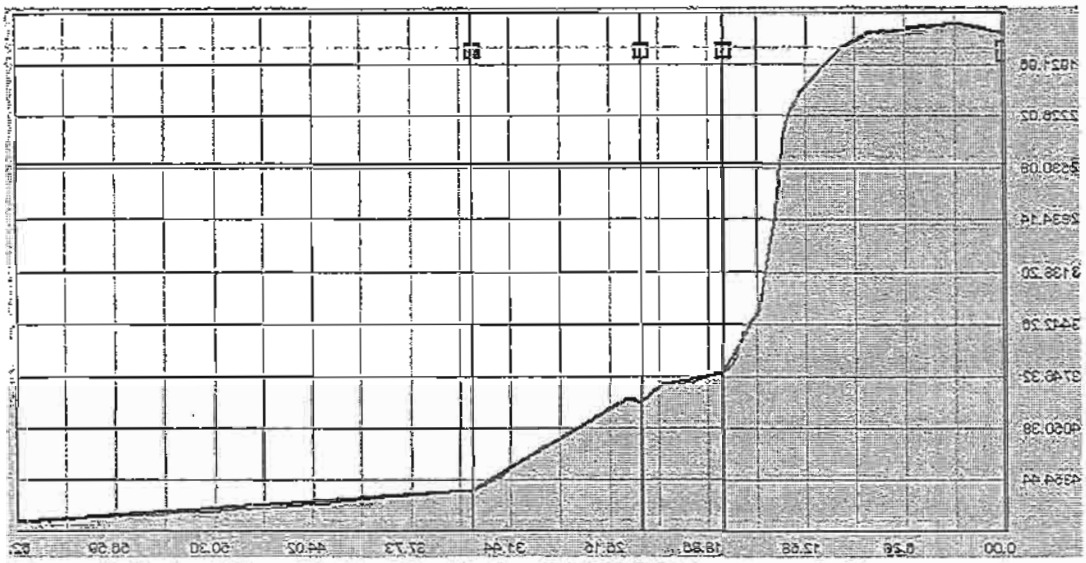


Figure 5: Foot of Slope Profile 57 with the CARIS LOTS automatically generated potential picks.

The FOS point selected on the foot of slope profile 57 was selected for the following reasons:

CARIS LOTS automatically generates three FOS potential picks on profile 57. Clearly the middle pick is not appropriate as it located in a localized depression (or local maximum) within the slope. The most landward pick is considered too far upslope, therefore the FOS point is selected at the outermost pick.

No continental rise is developed at this profile. This is consistent along the entire Goban Spur margin and most evident at FOS profile 59 and associated seismic line (CM-10).

The continental slope in this region is interpreted to be partially buried. The foot of slope is located at the end of this partially buried slope. This explains the apparent steep gradient in the overlying sedimentary cover. This occurs in both FOS57 and FOS58. The seismic line WI-23 referred to in Q. 9 has

been interpreted to show the top of the tilted crustal block beneath the sedimentary cover.

The selection of this FOS point (i.e. FOS57) is also consistent with the structural setting of the western edge of the Goban Spur where it has been extensively down-faulted (see Part III, Section 3.3.2.3).

NOTE: As with the previous three profiles it should be noted that the base of slope region was defined on the basis of morphology and the FOS57 point was selected on the basis of maximum change in gradient at the base of the slope.

Q.10 Seismic and seismic velocity data used in the determination of the 1% sediment thickness points

As indicated at our meeting yesterday the data requested by Questions 10a and 10b will be transmitted to the Subcommission upon return of the Delegation to Dublin. With regard to Q. 10c ("Range of error in the velocity analyses/velocity picks used in the depth conversion (Guidelines para. 8.3.11)") a paper addressing this issue is attached (IRL-DOC-07-09_Sept_2005).

Q.11 Detailed geological (structural) map

As indicated at yesterday's meeting work will begin on the production of the requested map upon return to Dublin. We will then arrange for the map to be transmitted to the Subcommission shortly thereafter.

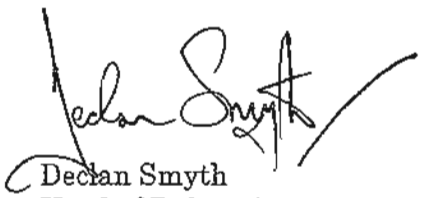
Q. 4 Clarifications concerning maps

Further to our discussions with regard to clarifications of certain aspects of maps we now enclose two revised maps (IRL-MAP-02-09_Sept_2005 – "Ireland – Outer Continental Shelf Limits – Porcupine Abyssal Plain – Automatic Fixed Points Solution" - and IRL-MAP-03-09_Sept_2005 – "Ireland – Outer Continental Shelf Limits – Porcupine Abyssal Plain – Manual Fixed Points Solution"). These maps have been printed by the Division for Ocean Affairs and the Law of the Sea from the above mentioned electronic files submitted by the Delegation of Ireland and I can confirm that the printed copies are true and complete copies of these files.

We also enclose herewith two shapefiles (IRL-SHP-01-09_Sept_2005.shp ("FP Fixed Points manual solution") and IRL-SHP-01-09_Sept_2005.shp (Straight Baselines connecting fixed points").

We trust that this information will be of assistance to the Subcommission in its consideration of the Submission of Ireland.

Yours sincerely



Declan Smyth
Head of Delegation

Encl.../

AN ROINN GNÓTHAÍ EACHTRACHA
DEPARTMENT OF FOREIGN AFFAIRS
BAILE ÁTHA CLIATH 2
DUBLIN 2

14 September 2005

Ref: IRL-LETT-04-14_Sept_2005

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman

I refer to the meetings last week at New York between the Subcommission established to consider the Irish Submission and the delegation of Ireland, and in particular to the question of future intersessional meetings.

Upon return to Dublin we have had an opportunity to consider the dates proposed by the Subcommission (i.e. 12-16 December next) and, as we feared, the schedule of meetings to which we are already committed will not allow us to travel to New York at all in December. However, thereafter our schedule is open. We are available to meet the Subcommission at any time suitable to members from 9 January 2006 until the end of March 2006. We very much look forward to any dates for such a meeting that the Subcommission may care to propose.

As regards specific matters raised by the Commission in writing during our meetings last week I would like to confirm that we are at present working on material in answer to Questions 5, 10, 11 and 12 and expect to be in a position to transmit this to the Subcommission within the next fortnight.

As I indicated to the Subcommission I will shortly leave my present position to take up duty at the Permanent Mission of Ireland to the United Nations at Geneva. I will be replaced by Ms. Lisa Walshe and I would be grateful therefore if all future correspondence between the Subcommission and the delegation of Ireland could be transmitted to her (Lisa.Walshe@dfa.ie).

Finally I would like to take this opportunity to thank the Subcommission for its continuing careful consideration of the Irish Submission.

Yours sincerely,

Declan Smyth
Head of Delegation

AN ROINN GNÓTHAÍ EACHTRACHA
DEPARTMENT OF FOREIGN AFFAIRS
BAILE ÁTHA CLIATH 2
DUBLIN 2

29 September 2005

Ref: IRL-LETT-05-29_Sept_2005

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman

I refer to your letter dated 15 September 2005 (Reference 05-02003) concerning the proposed dates for the next meeting between the Subcommission established to consider the Irish Submission and the delegation of Ireland.

I wish to inform you that the dates proposed by the Subcommission (23-27 January 2006) are suitable to the Irish delegation.

As regards specific matters raised by the Commission in writing last week and during our last meetings in New York earlier this month, I would like to confirm that we are at present working on material in answer to Questions 5, 10, 11, 12, 14 and 15 and expect to be in a position to transmit this to the Subcommission in the coming weeks.

We very much look forward to our next meeting and I would like to take this opportunity to thank the Subcommission for its continuing careful consideration of the Irish Submission.

Yours sincerely,

Lisa Walshe
Head of Delegation

AN ROINN GNÓTHAÍ EACHTRACHA
DEPARTMENT OF FOREIGN AFFAIRS
BAILE ÁTHA CLIATH 2
DUBLIN 2

4 November 2005

Ref: IRL-LETT-06-04_Nov_2005

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman

I refer to the meetings held in September 2005 in New York between the Subcommission established to consider the Irish Submission and the delegation of Ireland, and in particular to the Questions posed by the Subcommission during the course of those meetings and subsequent to those meetings.

The Delegation of Ireland wishes to respond to these Questions in the enclosed documents (in hard copy) as follows:

A. IRL-DOC-08-17_Oct_2005 – "Further Comment Regarding Q.9 and Q.12 of the Subcommission to Ireland"

B. IRL-DOC-09-17_Oct_2005 – "Clarification regarding Q.10, Q.14 and Q.15"

C. IRL-MAP-04-18_Oct_2005 – "Ireland – Geology and Structural Elements of the Continental shelf" requested in Q.11

D. Seismic Lines requested in Q.14:
WI-9
WI-11 (in two parts)
WI-13
WI-15

We also enclose herewith a CD containing A, B and C above and other relevant seismic data (as requested in Q.5 and Q.10a) in electronic (pdf) format.

CD CONTENTS

IRL-DOC-08-17_Oct_2005.pdf
IRL-DOC-09-17_Oct_2005.pdf
IRL-MAP-04-18_Oct_2005.pdf
IRL-Presentation-01-30_Aug_2005.pps
IRL-Presentation-02-06_Sept_2005.pps
IRL-Presentation-03-08_Sept_2005.pps
PAD95-12i.pdf – interpreted
PAD95-12u.pdf – uninterpreted
PAD95-13i.pdf
PAD95-13u.pdf
PAD95-14i.pdf
PAD95-14u.pdf
PAD95-15i.pdf
PAD95-15u.pdf
PAD95-16i.pdf
PAD95-16u.pdf

We trust that this information will be of assistance to the Subcommission in its consideration of the Submission of Ireland.

We very much look forward to our next meeting scheduled for 23-27 January 2006 and I would like to take this opportunity to thank the Subcommission for its continuing careful consideration of the Submission of Ireland.

Yours sincerely,

Lisa Walshe
Head of Delegation

AN ROINN GNOTHAI EACHTRACHA
DEPARTMENT OF FOREIGN AFFAIRS
BAILE ÁTHA CLIATH 2
DUBLIN 2

15 December 2005

Ref: IRL-LETT-07-15_Dec_2005

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman

I refer to the forthcoming meetings between the Subcommission established to consider the Irish submission and the delegation of Ireland, which are scheduled to take place in New York from 23-27 January 2006.

The Delegation of Ireland should be grateful to receive an indication from the Subcommission as to the material likely to be covered during these meetings and a list of specific issues that the Subcommission intends to raise.

We very much look forward to these meetings and I would like to take this opportunity to thank the Subcommission for its continuing careful consideration of the submission of Ireland.

Yours sincerely,

Lisa Walshe
Head of Delegation

AN ROINN GNÓTHAÍ EACHTRACHA
DEPARTMENT OF FOREIGN AFFAIRS
BAILE ÁTHA CLIATH 2
DUBLIN 2

11 January 2006

Ref: IRL-LETT-08-11_Jan_2006

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman,

I refer to the forthcoming meetings between the Subcommission established to consider the Irish Submission and the Delegation of Ireland, which are scheduled to take place in New York from 23-27 January 2006.

I wish to inform you that the Delegation of Ireland will consist of the following persons:

- Head of Delegation: Ms. Patricia O'Brien, Legal Adviser, Department of Foreign Affairs;
- Mr. Sean McDonald, Deputy Permanent Representative of Ireland to the United Nations;
- Ms. Lisa Walshe, Assistant Legal Adviser and Law of the Sea Director, Department of Foreign Affairs;
- Dr. Alain Murphy, Geologist, Petroleum Affairs Division, Department of Communications, Marine and Natural Resources; and
- Ms. Oonagh O'Loughlin, GIS Specialist, Petroleum Affairs Division, Department of Communications, Marine and Natural Resources

We very much look forward to these meetings and to receiving an agenda as soon as possible.

I would like to take this opportunity to thank the Subcommission for its continuing careful consideration of the Submission of Ireland.

Yours sincerely,

Patricia O'Brien
Head of Delegation

PF

PERMANENT MISSION OF
IRELAND TO THE UNITED NATIONS
1 DAG HAMMARSKJÖLD PLAZA
885 SECOND AVENUE, 19TH FLOOR
NEW YORK, NY 10017

TELEPHONE: (212) 421-6934
FAX: (212) 752-4726

23 January 2006

Ref: IRL-LETT-09-23_Jan_2006

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman

I refer to the meetings held in September 2005 in New York between the Subcommission established to consider the Irish Submission and the delegation of Ireland, and in particular to the Questions posed by the Subcommission during the course of those meetings and subsequent to those meetings

The Delegation of Ireland wishes to supply additional material in response to these Questions (in hard copy) as follows:

A. IRL-MAP-05-17_Jan_2006 – "Ireland Continental Shelf Limits, Porcupine Abyssal Plain – Slope of Slope Grid" (regional extent)

B. IRL-MAP-06-17_Jan_2006 – "Ireland Continental Shelf Limits, Porcupine Abyssal Plain – Profile Curvature Grid" (regional extent)

C. IRL-MAP-07-17_Jan_2006 – "Ireland Continental Shelf Limits, Porcupine Abyssal Plain – Slope of Slope Grid" (submission extent)

D. IRL-MAP-08-17_Jan_2006 – "Ireland Continental Shelf Limits, Porcupine Abyssal Plain – Profile Curvature Grid" (submission extent)

E. Seismic Lines (print of JPEG images):
WI-11
WI-15

I can confirm that A, B, C, D and E above are true and accurate copies of the original datasets. We also enclose herewith a CD containing A, B, C, D and E above, GIS

data related to Q. 9 and Q. 12 and seismic data (as requested in the letter of 15 November 2005) in electronic (SEG-Y and BMP) format.

CD CONTENTS

IRL-MAP-05-17_Jan_2006.pdf
IRL-MAP-06-17_Jan_2006.pdf
IRL-MAP-07-17_Jan_2006.pdf
IRL-MAP-08-17_Jan_2006.pdf
IRL-GRID-01
IRL-GRID-02
IRL-GRID-03
IRL-SHP-03-17_JAN_2006.shp
IRL-SHP-04-17_JAN_2006.shp
IRL-SHP-05-17_JAN_2006.shp
IRL-SHP-06-17_JAN_2006.shp
IRL-SHP-07-17_JAN_2006.shp
IRL-SHP-08-17_JAN_2006.shp
IRL-SHP-10-17_JAN_2006.shp
IRL-SHP-11-17_JAN_2006.shp
IRL-SHP-12-17_JAN_2006.shp
IRL-SHP-13-17_JAN_2006.shp
IRL-SHP-14-17_JAN_2006.shp
LWI_09_RSTK.sgy
LWI_11A_RSTK.sgy
LWI_11B_RSTK.sgy
LWI_13_RSTK.sgy
LWI_15_RSTK.sgy
LWI_09_RSTK.bmp
LWI_11A_RSTK.bmp
LWI_11B_RSTK.bmp
LWI_13_RSTK.bmp
LWI_15_RSTK.bmp
WI_11_2.jpg
WI_15.jpg

We trust that this information will be of assistance to the Subcommission in its consideration of the Submission of Ireland.

Yours sincerely,

Patricia O'Brien
Head of Delegation

PERMANENT MISSION OF
IRELAND TO THE UNITED NATIONS
1 DAG HAMMARSKJÖLD PLAZA
885 SECOND AVENUE, 19TH FLOOR
NEW YORK, NY 10017

TELEPHONE: (212) 421-6934
FAX: (212) 752-4726

25 January 2006

Ref: IRL-LETT-10-25_Jan_2006

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman,

I refer to our meetings held on 23 and 24 January 2006 between the Delegation of Ireland and the Subcommission established to consider the Submission made by Ireland and, in particular, to the Questions posed by the Subcommission during the course of those meetings.

The Delegation of Ireland wishes to respond to these Questions as follows:

Q. 16 Character of the continental slope:

With regard to Q.16 (16.1 – 16.7 inclusive) a paper addressing the character of the continental slope is enclosed herewith as IRL-DOC-10-25_Jan_2006.

Q.17 Content of the presentation made by the Delegation of Ireland on 23 January 2006:

We wish to confirm that there was nothing in particular in the introductory part of the presentation made by the Delegation of Ireland on 23 January 2006 that we wish to draw to the attention of the Subcommission. As indicated at our meeting on 23 January 2006, we were availing of the opportunity of this presentation to recall some key issues by way of introduction to the more technical presentation.

Q.18 Kimbell Study:

With regard to the 2005 Report by Kimbell, Ritchie and Henderson on the Irish Passive Modelling Project referred to in the presentation made by the Delegation of Ireland to the Subcommission on 23 January 2006, we note that in Q.18 reference is made to the Report as having been commissioned *by* the British Geological Survey. The Delegation of Ireland wish to make clear that the Report was commissioned *from* the British Geological Survey by the Petroleum Infrastructure Programme (PIP) which is an Irish joint industry project (JIP)(www.pip.ie). We also wish to confirm that this Report (enclosed herewith in electronic format on a CD) is not available in the public domain as yet.

Q.19 Seismic profiles labelling:

We wish to confirm that the seismic profiles contained in the presentation made by the Delegation of Ireland to the Subcommission on 23 January 2006 have now been labelled in terms of which foot of slope points they support.

Presentations:

The presentations made by the Delegation of Ireland to the Subcommission on 23 and 24 January 2006 are enclosed herewith in electronic format on a CD.

GIS Data:

The enclosed CD also contains GIS data related to geomorphometric analyses as requested on 24 January 2006. Shapefiles IRL-SHP-03-17_Jan_2006.shp to IRL-SHP-14-17_Jan_2006.shp as submitted on 23 January 2006 have been unprojected from UTM Zone 28N WGS84 datum to geographic coordinate system WGS84 datum (IRL-SHP-15-25_Jan_2006.shp to IRL-SHP-26-25_Jan_2006.shp). These shapefiles include metadata describing the shapefile content. Also included are grids IRL-GRID-01 to IRL-GRID-03 - metadata for these grids has been updated to include information on grid units. The CD also contains layer files IRL-GRID-01.lyr to IRL-GRID-03.lyr which preserve the symbology for each grid.

CARIS LOTS profiles:

Also enclosed on the CD are updated CARIS LOTS profiles (BMP files), edited and unedited CARIS LOTS output text files for each of the four key FOS points (FOS50, 51, 53 and 57) citing the gradients in degrees rather than percent to aid the Subcommission in their examination of the profiles. Hardcopy versions of the edited CARIS LOTS output files are also enclosed and I can confirm that these are true and accurate copies of the original datasets.

CD CONTENTS:

IRL-Presentation-04-23_Jan_2006.pps
IRL-Presentation-05-24_Jan_2006.pps

IRL-DOC-10-25_Jan_2006

IRL-SHP-15-25_JAN_2006.shp - FOS line 50 bathymetric profile point data
IRL-SHP-16-25_JAN_2006.shp - FOS line 51 bathymetric profile point data
IRL-SHP-17-25_JAN_2006.shp - FOS line 53 bathymetric profile point data
IRL-SHP-18-25_JAN_2006.shp - FOS line 57 bathymetric profile point data
IRL-SHP-19-25_JAN_2006.shp - FOS line 50 slope of slope profile point data
IRL-SHP-20-25_JAN_2006.shp - FOS line 51 slope of slope profile point data
IRL-SHP-21-25_JAN_2006.shp - FOS line 53 slope of slope profile point data
IRL-SHP-22-25_JAN_2006.shp - FOS line 57 slope of slope profile point data
IRL-SHP-23-25_JAN_2006.shp - FOS line 50 profile curvature point data
IRL-SHP-24-25_JAN_2006.shp - FOS line 51 profile curvature point data
IRL-SHP-25-25_JAN_2006.shp - FOS line 53 profile curvature point data
IRL-SHP-26-25_JAN_2006.shp - FOS line 57 profile curvature point data

IRL-GRID-01 - Slope grid
IRL-GRID-02 - Slope of Slope grid
IRL-GRID-03 - Profile Curvature grid
IRL-GRID-01.lyr - Slope grid symbology
IRL-GRID-02.lyr - Slope of Slope grid symbology
IRL-GRID-03.lyr - Profile Curvature grid symbology

FOS_50_DP_DegreeSlope.bmp - CARIS LOTS FOS 50 profile
FOS_50_DP_DegreeSlope.txt - CARIS LOTS FOS 50 output file (unedited)
FOS_50_DP_DegreeSlope_ED.txt - CARIS LOTS FOS 50 output file (edited)
FOS_51_DP_DegreeSlope.bmp - CARIS LOTS FOS 51 profile
FOS_51_DP_DegreeSlope.txt - CARIS LOTS FOS 51 output file (unedited)
FOS_51_DP_DegreeSlope_ED.txt - CARIS LOTS FOS 51 output file (edited)
FOS_53_DP_DegreeSlope.bmp - CARIS LOTS FOS 53 profile
FOS_53_DP_DegreeSlope.txt - CARIS LOTS FOS 53 output file (unedited)
FOS_53_DP_DegreeSlope_ED.txt - CARIS LOTS FOS 53 output file (edited)
FOS_57_DP_DegreeSlope.bmp - CARIS LOTS FOS 57 profile
FOS_57_DP_DegreeSlope.txt - CARIS LOTS FOS 57 output file (unedited)
FOS_57_DP_DegreeSlope_ED.txt - CARIS LOTS FOS 57 output file (edited)

We trust that the above information will be of assistance to the Subcommission in its continuing careful consideration of the Irish submission.

Yours sincerely,

Patricia O'Brien
Head of Delegation

TELEPHONE: (212) 421-6934
FAX: (212) 752-4726

PERMANENT MISSION OF
IRELAND TO THE UNITED NATIONS
1 DAG HAMMARSKJÖLD PLAZA
885 SECOND AVENUE, 19TH FLOOR
NEW YORK, NY 10017

26 January 2006

Ref: IRL-LETT-11-26_Jan_2006

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman,

I refer to our meeting held on 25 January 2006 between the Delegation of Ireland and the Subcommission established to consider the Submission made by Ireland and, in particular, to the Questions posed by the Subcommission during the course of that meeting.

The Delegation of Ireland wishes to inform the Subcommission as follows:

As indicated at our meeting yesterday afternoon, formal replies to Questions 20 and 21 will be transmitted to the Subcommission upon return of the Delegation to Dublin. In the interim we are now providing seismic lines PAD95-09, PAD95-10 and PAD95-11 as jpeg images on a CD enclosed herewith.

Also enclosed on this CD is the presentation made by the Delegation of Ireland on the character of the continental margin associated with the southern part of the Rockall Trough.

Q. 22 Clarification of response to Question 10b:

The Delegation of Ireland wish to clarify the discrepancy in our reply to Question 10b contained in document IRL-DOC-09-17_Oct_2005. This should have read as follows:

"Ireland regrets to inform the Subcommission that we are unable to accommodate the request for the actual velocity analysis/velocity picks used from the processing job. It appears that we did not receive this data at the time the deliverables were transmitted to the Petroleum Affairs Division by the contractors (1995). Given the time that has passed we do not believe that this data would still be available. We hope that clarifications already provided in respect of the error analysis for the seismic data used in establishing the 1% sediment thickness points will suffice for the further consideration of the Subcommission (see documents IRL-DOC-07-09_Sept_2005 and IRL-LETT-02-08_Sept_2005".

We trust that the above information will be of assistance to the Subcommission in its continuing careful consideration of the Irish submission.

Yours sincerely,

Patricia O'Brien
Head of Delegation

PERMANENT MISSION OF
IRELAND TO THE UNITED NATIONS
1 DAG HAMMARSKJÖLD PLAZA
885 SECOND AVENUE, 19TH FLOOR
NEW YORK, NY 10017

TELEPHONE (212) 421-6934
FAX (212) 752-4726

27 January 2006

Ref: IRL-LETT-12-27_Jan_2006

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman,

I refer to our meeting held on 26 January 2006 between the Delegation of Ireland and the Subcommission established to consider the Submission made by Ireland and, in particular, to the Question posed by the Subcommission during the course of that meeting.

The Delegation of Ireland wishes to inform the Subcommission that a formal reply to Questions 23 will be transmitted to the Subcommission upon return of the Delegation to Dublin.

The Delegation also wishes to clarify the discrepancy in our reply to Question 16 contained in document IRL-DOC-10-25_Jan_2006. The reference to "1.29 degs" in Figure 1d on page 4 of this document should have read "0.2 degs" and the paragraph at the top of page 7 should have read as follows:

"Further morphological evidence for the location of the rise is provided by examining the gradients of the sea floor seaward of the Foot of Slope points. For the northern three profiles (FOS50, 51 and 53), this gradient is 0.3 – 0.8°. These lower gradients distinguish the rise from the lower slope, which has a gradient of approximately 2°. For profile FOS57, the deep ocean floor appears to have a gradient of approximately 0.2° (Fig. 1d) that extends seaward to a seamount feature in the Porcupine Abyssal Plain (Fig. 2d)."

We trust that the above information will be of assistance to the Subcommission in its continuing careful consideration of the Irish submission.

Yours sincerely,

Patricia O'Brien
Head of Delegation

AN ROINN GNÓTHAÍ EACHTRACHA
DEPARTMENT OF FOREIGN AFFAIRS
BAILE ÁTHA CLIATH 2
DUBLIN 2

3 April 2006

Ref: IRL-LETT-13-03_April_2006

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman,

I refer to the forthcoming meetings between the Subcommission established to consider the Irish Submission and the Delegation of Ireland, which are scheduled to take place in New York from 10 April 2006.

I wish to inform you that the Delegation of Ireland will consist of the following persons:

- Head of Delegation: Ms. Lisa Walshe, Assistant Legal Adviser and Law of the Sea Director, Department of Foreign Affairs;
- H.E. David Cooney, Permanent Representative of Ireland to the United Nations;
- Mr. Sean McDonald, Deputy Permanent Representative of Ireland to the United Nations;
- Dr. Alain Murphy, Geologist, Petroleum Affairs Division, Department of Communications, Marine and Natural Resources; and
- Ms. Oonagh O'Loughlin, GIS Specialist, Petroleum Affairs Division, Department of Communications, Marine and Natural Resources

We very much look forward to these meetings and to receiving an agenda as soon as possible.

I would like to take this opportunity to thank the Subcommission for its continuing careful consideration of the Submission of Ireland.

Yours sincerely,

Lisa Walshe
Head of Delegation

PERMANENT MISSION OF
IRELAND TO THE UNITED NATIONS
1 DAG HAMMARSKJÖLD PLAZA
885 SECOND AVENUE, 19TH FLOOR
NEW YORK, NY 10017

TELEPHONE (212) 421-6934
FAX: (212) 752-4726

10 April 2006

Ref: IRL-LETT-14-10_April_2006

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman,

I refer to the meetings held in January 2006 in New York between the Subcommission established to consider the Irish Submission and the Delegation of Ireland, and in particular to the Questions 10a, 20, 21 and 23 posed by the Subcommission during the course of those meetings.

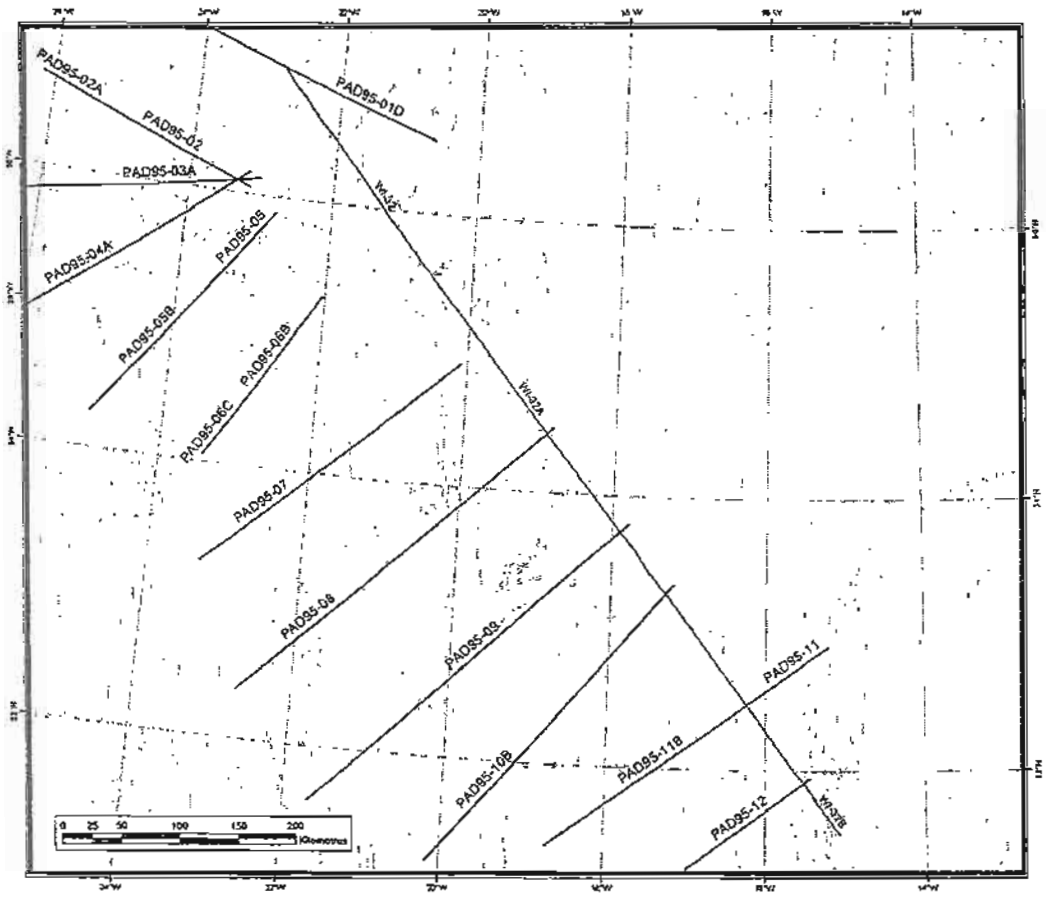
The Delegation of Ireland wishes to respond to these Questions as follows:

Q. 10a. Interpreted and uninterpreted seismic profiles in the vicinity of the 1% point.

Further to the request for interpreted and uninterpreted seismic profiles in the vicinity of the 1% point, we are providing PDF files with both the interpreted and uninterpreted seismic profiles. Also included are jpeg files with the annotated 1% point indicated. Please note that these 1% points are those recalculated as a result of answers to Q. 23 posed by the Subcommission established to examine the Submission of Ireland to the CLCS (see below).

Q. 20. Character of the Continental Slope in the "Mouth of the Rockall Trough" area.

In addition to the IRL-Presentation-6-26_Jan_2006, which contained slides on the character of the Rockall Trough, we are pleased to be able to provide PAD95-10 and 11, and WI-32 which crosses the Rockall Trough. These are provided in SEG-Y, high-resolution bitmap images (in addition to jpeg images previously provided) and paper copies. A location map for these profiles is shown below. The Subcommission is also directed to the selected bibliography outlined in the presentation of the 26th of January 2006.



Q. 21. Comparison of Interval Velocities derived from CDP stacking velocities and DSDP drill holes

As requested by the Subcommission, a comparative analysis of velocities derived from the seismic profiles compared to the sonic velocities of DSDP Leg 80 drill sites is provided in IRL-DOC-12-10_Apr_2006. We hope that this information will aid the Subcommission in its verification of stacking velocities for the area.

Q. 23. 1% Sediment Thickness formula points (FP1 &FP2)

Ireland has calculated sediment thickness using the –10% average interval velocity for every shot point in the region of the 1% sediment thickness point. We have also recalculated the geodetic distances from the foot of the continental slope to these points. These results are given in accompanying document IRL-DOC-13-10_Apr_2006. The recalculated Fixed Points (FPs) are given in document IRL-DOC-14-10_Apr_2006 and associated GIS shapefiles (IRL-SHP-27, 28 and 29) are also provided. The 1% sediment thickness points are now fully compliant with Article 76 and the stated methodology of Ireland in its submission (Submission of Ireland, Part III, Section 3.3.4.3).

Further comment and clarification on the definition of the foot of the continental slope in the Submission of Ireland in the area abutting the Porcupine Abyssal Plain.

Ireland has carefully considered the feedback and comments of the Subcommission provided in its letter of the 27th January 2006. In view of the advice provided by the Subcommission, and the geological nature of the Irish continental margin, we are presenting geological and geophysical evidence for the location of the foot of the continental slope along the Irish non-volcanic passive margin in IRL-DOC-11-10_Apr_2006.

The Delegation of Ireland wishes to supply additional material in response to these Questions (in hard copy) as follows:

A. IRL-DOC-11-10_Apr_2006 – "Geological and Geophysical Evidence for the Location of the Foot of the Continental Slope along the Irish Non-volcanic Passive Margin".

B. IRL-DOC-12-10_Apr_2006 – " Comparison of Interval Velocities derived from CDP stacking velocities and DSDP drill holes". (Q. 21)

C. IRL-DOC-13-10_Apr_2006 – "Sediment thickness values for SPs on lines PAD95-12 and PAD95-13 and distance to the foot of slope". (Q.23)

D. IRL-DOC-14-10_Apr_2006 – "Co-ordinates of Fixed Points used to define the Outer Limits of the Extended Shelf in the area abutting the Porcupine Abyssal Plain". (Q. 23)

E. Seismic lines as requested in Q. 10a (print of JPEG images)
   PAD95-12 (2 copies)
   PAD95-13 (2 copies)

I can confirm that the items listed above are true and accurate copies of the original datasets.

We also enclose herewith:

1. A CD containing A, B, C, D and E above, a reference paper (Bullock & Minshull, 2005) related to D above in PDF format and sonic velocity data for DSDP sites (related to Q. 21) in text file format.

2. A DVD containing GIS data related to Q. 23 in geographic coordinate system WGS84 datum (shapefiles include ISO-compliant metadata describing shapefile content), seismic data as requested in Q. 10a and Q. 20 in electronic (SEG-Y, BMP and PDF) format and a 3D fly-through of the partial submission area as requested during the meetings held in January 2006.

CD CONTENTS

IRL-DOC-11-10_Apr_2006.doc
IRL-DOC-12-10_Apr_2006.doc
IRL-DOC-13-10_Apr_2006.doc
IRL-DOC-14-10_Apr_2006.doc
bullock_minshull_2005.pdf – Paper by Bullock & Minshull (2005) - "From continental extension to seafloor spreading: crustal structure of the Goban Spur rifted margin, southwest of the UK" in PDF format
PAD95-12-1pc.jpg – Interpreted seismic line PAD95-12 in JPEG format
PAD95-13-1pc.jpg – Interpreted seismic line PAD95-13 in JPEG format
Sonic_dat548.txt – Sonic velocity data for DSDP site 548
Sonic_dat549.txt – Sonic velocity data for DSDP site 549
Sonic_dat550.txt – Sonic velocity data for DSDP site 550
Sonic_dat551.txt – Sonic velocity data for DSDP site 551
Sonic548.txt – Sonic velocity data for DSDP site 548
Sonic549.txt – Sonic velocity data for DSDP site 549
Sonic550.txt – Sonic velocity data for DSDP site 550
Sonic551.txt – Sonic velocity data for DSDP site 551

DVD CONTENTS

IRL-SHP-27-10_Apr_2006.shp – 1% Sediment thickness points
IRL-SHP-28-10_Apr_2006.shp – Outer limit fixed points
IRL-SHP-29-10_Apr_2006.shp – Straight lines connecting fixed outer limit points
PAD95_10.sgy – Seismic line PAD95-10 in SEG-Y format
PAD95_11.sgy – Seismic line PAD95-11 in SEG-Y format
WI_32.sgy – Seismic line WI-32 in SEG-Y format
PAD95_10.bmp – Seismic line PAD95-10 in BMP format
PAD95_11.bmp – Seismic line PAD95-11 in BMP format
WI_32.bmp – Seismic line WI-32 in BMP format
PAD95line12.pdf – Uninterpreted seismic line PAD95-12 in PDF format
PAD95line13.pdf – Uninterpreted seismic line PAD95-13 in PDF format
PAD95line12_unint.pdf – Interpreted seismic line PAD95-12 in PDF format
PAD95line13_unint.pdf – Interpreted seismic line PAD95-13 in PDF format
3D_flight.avi – fly-through movie of partial submission area.

We trust that this information will be of assistance to the Subcommission in its consideration of the Submission of Ireland.

Yours sincerely,

Lisa Walshe
Head of Delegation

PERMANENT MISSION OF
IRELAND TO THE UNITED NATIONS
1 DAG HAMMARSKJÖLD PLAZA
885 SECOND AVENUE, 19TH FLOOR
NEW YORK, NY 10017

TELEPHONE: (212) 421-6934
FAX: (212) 752-4726

12 April 2006

Ref: IRL-LETT-15-12_April_2006

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman,

I refer to our meeting held on 10 April 2006 between the Subcommission established to consider the Irish Submission and the Delegation of Ireland, and in particular to the Questions 24 and 25 posed by the Subcommission on 11 April 2006. The Delegation of Ireland wishes to respond to these Questions as follows:

Q. 24 Table summarising the FOS points selected, the criterion invoked and the fixed points generated:

A table summarising the foot of continental slope points selected, the criterion invoked and the fixed points generated etc is enclosed herewith as IRL-DOC-15-12_Apr_2006.

Q. 25 Additional seismic or other data required to support FOS 53 *per se* and FOS 57:

Additional data coincident with FOS 57 is outlined in IRL-DOC-16-12_Apr_2006. We are also providing an article from *Marine Geology* [1979, Volume 33, pages 45-69] entitled "Sedimentary Succession and Tectonic History of a Marginal Plateau (Goban Spur, Southwest of Ireland)" by Dingle and Scrutton. No further data exists in the region of FOS 53 and further explanation is contained in paragraph 3 of IRL-DOC-16-12_Apr_2006.

We trust that this information will be of assistance to the Subcommission in its consideration of the Submission of Ireland.

Yours sincerely,

Lisa Walshe
Head of Delegation

PERMANENT MISSION OF
IRELAND TO THE UNITED NATIONS
1 DAG HAMMARSKJÖLD PLAZA
885 SECOND AVENUE, 19TH FLOOR
NEW YORK, NY 10017

TELEPHONE: (212) 421-6934
FAX: (212) 752-4726

19 April 2006

Ref: IRL-LETT-16-19_April_2006

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman,

I refer to our meetings held last week between the Subcommission established to consider the Irish Submission and the Delegation of Ireland.

We now enclose herewith a CD containing the following documents the originals of which were transmitted to the Subcommission last week in hard copy:

IRL-DOC-15-12_Apr_2006
IRL-DOC-16-12_Apr_2006
IRL-LETT-14-10_April_2006
IRL-LETT-15-12_April_2006
IRL-Presentation-07-10_April_2006.pps
Dingle & Scrutton 1979.pdf

I hereby certify that the enclosed CD contains true and accurate copies of the original (hard copy) documents already submitted.

The Delegation of Ireland would like to take this opportunity to thank the Subcommission for its continuing careful consideration of the Submission of Ireland.

Yours sincerely,

Lisa Walshe
Head of Delegation

AN ROINN GNÓTHAÍ EACHTRACHA
DEPARTMENT OF FOREIGN AFFAIRS
BAILE ÁTHA CLIATH 2
DUBLIN 2

21 July 2006

Ref: IRL-LETT-17-21_July_2006

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman,

I refer to the meetings held in April 2006 in New York between the Subcommission established to consider the Irish Submission and the Delegation of Ireland, and in particular to the presentation dated 19 April 2006 wherein the Subcommission outlined its preliminary conclusions.

The Delegation of Ireland recalls that in the above-mentioned presentation the Subcommission outlined its preliminary conclusions as follows:

- "The partial submission passed the Test of Appurtenance, and Ireland is entitled to delineate the outer limit beyond 200M;
- The selection of FOSs 46, 50, 51, 57 & 60 is endorsed;
- FOS 53 that generates revised fixed-point FP 15 is not justified by the available data, information, or clarifications;
- The adjusted sediment thickness points forming new fixed points FP 1 & 2 generated from FOSs 46 & 50 respectively, are accepted;
- The original Submission, with the above adjustments, could be endorsed; or in other words, the adjusted outer limit using FOS 53, could not be recommended at this advanced stage of examination."

The Delegation wishes to inform the Subcommission as follows:

Ireland accepts in full the preliminary conclusions of the Subcommission and is prepared, therefore, to accept the loss of FOS 53 from the final outer limit solution.

As has been demonstrated previously (IRL-LETT-01-07_Sept_2005), the CARIS LOTS automatically selected solution for the straight-line segments produces a less than optimal solution. For this reason Ireland has again manually selected the fixed points joining straight line segments that comprise the outer limits without the influence of FOS53. The updated outer limits of the continental shelf are derived from FOS 46, 50, 51, 57 and 60. The justification for these points has already been established by Ireland and accepted by the Subcommission in its preliminary conclusions.

Accordingly, we now submit to the Subcommission an updated table of fixed point coordinates (IRL-DOC-18-19_July_2006), along with straight line segments (with distances), relevant foot of slope points and method used to determine the fixed points (i.e. Hedberg or Gardiner).

We are also submitting herewith the following:

- IRL-MAP-09-19_July_2006 - a new map consistent with the format of IRL-MAP-03-09_Sept_2005 showing the configuration of the outer limit of the continental shelf as now proposed by Ireland;
- IRL-DOC-17-19_July_2006 - Figure 1 shows the change in the position of the outer limit as a result of these changes;
- IRL-SHP-30-19_July_2006 and IRL-SHP-31-19_July_2006 - GIS shapefiles with the new fixed points and straight line segments.

We also enclose herewith a CD containing the above mentioned documents and I certify that this CD contains true and accurate copies of the original (hard copy) documents submitted to the Subcommission under the cover of this letter.

CD CONTENTS:

IRL-DOC-17-19_July_2006
IRL-DOC-18-19_July_2006
IRL-MAP-09-19_July_2006
IRL-SHP-30-19_July_2006
IRL-SHP-31-19_July_2006

The Delegation of Ireland would like to take this opportunity to thank the Subcommission for its careful consideration of the Submission of Ireland and we look forward to receiving the recommendations of the Commission in due course.

Yours sincerely,

Lisa Walshe
Head of Delegation

BAILE ATHA CLIATH 2
DUBLIN 2

27 July 2006

Ref: IRL-LETT-18-27_July_2006

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman,

I refer to my letter IRL-LETT-17-21_July_2006.

The Delegation of Ireland wishes to clarify a discrepancy contained in document IRL-DOC-18-19_July_2006 submitted to the Subcommission under the cover of this letter. The reference to "104056.81" as the distance from outer limit fixed point 1 and outer limit fixed point 2 is incorrect and should read "104059.81".

Accordingly, we now submit to the Subcommission a corrected table of fixed point coordinates (IRL-DOC-19-27_July_2006), along with straight line segments (with distances), relevant foot of slope points and method used to determine the fixed points (i.e. Hedberg or Gardiner).

The Delegation of Ireland would like to take this opportunity to thank the Subcommission for its careful consideration of the Submission of Ireland and we look forward to receiving the recommendations of the Commission in due course.

Yours sincerely,

Lisa Walshe
Head of Delegation

PERMANENT MISSION OF
IRELAND TO THE UNITED NATIONS
1 DAG HAMMARSKJÖLD PLAZA
885 SECOND AVENUE, 19TH FLOOR
NEW YORK, NY 10017

TELEPHONE: (212) 421-6934
FAX: (212) 752-4726

25 August 2006

Ref: IRL-LETT-19-25_Aug_2006

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman,

I refer to the Subcommission established to consider the Submission made by Ireland and, in particular, to Question 26 posed by the Subcommission on 23 August 2006.

The Delegation of Ireland wishes to respond to this Question as follows:

Fixed Points 1 and 2 of the coordinate list in IRL-DOC-19-27_Jul_2006.doc reflect a transformation of the specified PAD95 shotpoint locations to WGS84 geodetic datum as the survey datum (and hence the navigation file PADS95.txt) for the PAD 1995 seismic survey is European Datum 1950. The relevant shotpoints from IRL-DOC-13-10_Apr_2006.doc are now submitted below to include the transformed coordinate information.

Line	SPN	Latitude (ED50)	Longitude (ED50)	Latitude (WGS84)	Longitude (WGS84)
SPAD95-12	4783	51-02-17.03N	17-29-30.26W	51.0369536N	17.4934128W
SPAD95-13	11736	50-15-00.38N	16-41-56.05W	50.2489863N	16.7005384W

The transformation parameters applied are as follows:

from datum:
6378388.000000 297.000000 -86.000000 -96.000000 -120.000000 0.000000 0.000000 0.000000 0.000000 EUR-K
to datum:
6378137.000000 298.257224 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 WGS84

PF

We also wish to inform you that there is a typographical error on the image PAD95-13-1pc.jpg submitted on 10 April 2006. The shotpoint identified on the image reads "SPN 11763". This should read "SPN 11736".

The Delegation of Ireland would like to take this opportunity to thank the Subcommission for its careful consideration of the Submission of Ireland and we look forward to receiving the recommendations of the Commission in due course.

Yours sincerely,

Lisa Walshe
Head of Delegation

19 - 25 Aug 2006

PERMANENT MISSION OF
IRELAND TO THE UNITED NATIONS
1 DAG HAMMARSKJÖLD PLAZA
885 SECOND AVENUE, 19TH FLOOR
NEW YORK, NY 10017

TELEPHONE: (212) 421-6934
FAX: (212) 752-4726

28 August 2006

Ref: IRL-LETT-20-28_Aug_2006

Mr. Abu Bakar Jaafar
Chairman of the Subcommission for the consideration
of the Submission made by Ireland
Commission on the Limits of the Continental Shelf
c/o Division for Ocean Affairs and the Law of the Sea
United Nations Secretariat
New York

Dear Chairman,

I refer to the Subcommission established to consider the Submission made by Ireland and, in particular, to Question 26 posed by the Subcommission on 23 August 2006.

Further to this question, Ireland wishes to clarify the geodetic distances from the foot of the continental slope to PAD95 shotpoints in the vicinity of the 1% sediment thickness points. Having reconsidered the distance calculations in IRL-DOC-19-10_Apr_2006 due to concerns regarding different geodetic datums (namely FOS points on WGS84 geodetic datum and PAD95 seismic line shotpoints on European Datum 1950), we have recalculated the geodetic distance from FOS 46 to shotpoints on PAD95-12 and from FOS 50 to shotpoints on PAD95-13 using the WGS84 geodetic datum for all coordinates. The results are presented in the attached table, IRL-DOC-20-28_Aug_2006.

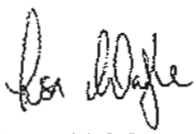
Although the distances to the FOS points differ from those presented in IRL-DOC-13-10_Apr_2006, the 1% sediment thickness points are located at the same shotpoints as previously described, i.e. SPN 4783 on PAD95-12 and SPN 11736 on PAD95-13. Typical differences between WGS84 and ED50 are on average 175m – this translates to a difference of 1.5 to 2m of sediment thickness (depending on ~10% thickness value) between the previous final values and the recalculated final values.

Therefore the recalculated sediment thickness values for the indicated shotpoints remain compliant with Article 76 and the methodology described in the Submission of Ireland document, Part III, Section 3.3.4.3. Thus the locations of FP1 and FP2 as described in IRL-DOC-19-27_July_2006 have not changed.

The attached revised 1% sediment thickness formula table (IRL-DOC-20-28_Aug_2006) now contains shotpoint locations as presented in the PAD95 seismic navigation data file (PAD95S.txt) on ED50 datum, shotpoint locations transformed to WGS84 datum and recalculated values for 1% sediment thickness. We also wish to confirm that all distances have been measured on the WGS84 geodetic datum and that FP1 and FP2 from IRL-DOC-19-27_July_2006 represent WGS84 geodetic transformations of PAD95-12 SPN 4783 and PAD95-13 SPN 11736 respectively.

The Delegation of Ireland would like to take this opportunity to thank the Subcommission for its careful consideration of the Submission of Ireland and we look forward to receiving the recommendations of the Commission in due course.

Yours sincerely,



Lisa Walshe
Head of Delegation

IRL-DOC-01-07_Sept_2005

Co-ordinates of Fixed Points used to define the Outer Limits of the Extended Shelf in the area abutting the Porcupine Abyssal Plain as determined by CARIS LOTS automated solution

ID	Latitude	Longitude	Corresponding FOS Point	Base of Slope Region	Method	From ID	To ID	Distance (m)	Distance(M)
1	51.0376718	-17.4926083	FOS 46	Mouth Rockall Trough	1% Sediment Thickness				
2	50.2478896	-16.7035439	FOS 50	Porcupine Bank	1% Sediment Thickness	1	2	104085.29	56.20
3	50.0691902	-16.5126452	FOS 51	Porcupine Bank	FOS + 60M	2	3	24107.91	13.02
4	50.0554937	-16.4979397	FOS 51	Porcupine Bank	FOS + 60M	3	4	1851.94	1.00
5	50.0419552	-16.4828907	FOS 51	Porcupine Bank	FOS + 60M	4	5	1851.88	1.00
6	50.0285778	-16.4675026	FOS 51	Porcupine Bank	FOS + 60M	5	6	1851.88	1.00
7	50.0153645	-16.4517798	FOS 51	Porcupine Bank	FOS + 60M	6	7	1851.91	1.00
8	50.0023213	-16.4357247	FOS 51	Porcupine Bank	FOS + 60M	7	8	1851.84	1.00
9	49.9894483	-16.4193439	FOS 51	Porcupine Bank	FOS + 60M	8	9	1851.95	1.00
10	49.9767514	-16.4026397	FOS 51	Porcupine Bank	FOS + 60M	9	10	1851.97	1.00
11	49.2097194	-15.4275948	FOS 57	Gollum Channel	FOS + 60M	10	11	110665.59	59.75
12	49.1932741	-15.4236130	FOS 57	Gollum Channel	FOS + 60M	11	12	1851.83	1.00
13	49.1768732	-15.4192158	FOS 57	Gollum Channel	FOS + 60M	12	13	1851.94	1.00
14	49.1605229	-15.4144053	FOS 57	Gollum Channel	FOS + 60M	13	14	1851.90	1.00
15	49.1442276	-15.4091816	FOS 57	Gollum Channel	FOS + 60M	14	15	1851.88	1.00
16	49.1279917	-15.4035514	FOS 57	Gollum Channel	FOS + 60M	15	16	1851.78	1.00
17	49.1118183	-15.3975125	FOS 57	Gollum Channel	FOS + 60M	16	17	1851.91	1.00
18	49.0957133	-15.3910671	FOS 57	Gollum Channel	FOS + 60M	17	18	1851.87	1.00
19	49.0796798	-15.3842174	FOS 57	Gollum Channel	FOS + 60M	18	19	1851.97	1.00
20	49.0637237	-15.3769680	FOS 57	Gollum Channel	FOS + 60M	19	20	1851.86	1.00
21	49.0478481	-15.3693211	FOS 57	Gollum Channel	FOS + 60M	20	21	1851.90	1.00
22	49.0320589	-15.3612745	FOS 57	Gollum Channel	FOS + 60M	21	22	1851.86	1.00
23	49.0163592	-15.3528370	FOS 57	Gollum Channel	FOS + 60M	22	23	1851.80	1.00
24	49.0007521	-15.3440066	FOS 57	Gollum Channel	FOS + 60M	23	24	1852.00	1.00
25	48.9852450	-15.3347876	FOS 57	Gollum Channel	FOS + 60M	24	25	1851.81	1.00
26	48.9698395	-15.3251846	FOS 57	Gollum Channel	FOS + 60M	25	26	1851.85	1.00
27	48.9545401	-15.3151976	FOS 57	Gollum Channel	FOS + 60M	26	27	1851.94	1.00

28	48.9393514	-15.3048333	FOS 57	Gollum Channel	FOS + 60M	27	28	1851.88	1.00
29	48.9242780	-15.2940895	FOS 57	Gollum Channel	FOS + 60M	28	29	1851.94	1.00
30	48.9093243	-15.2829750	FOS 57	Gollum Channel	FOS + 60M	29	30	1851.78	1.00
31	48.8944919	-15.2714901	FOS 57	Gollum Channel	FOS + 60M	30	31	1851.96	1.00
32	48.8797885	-15.2596368	FOS 57	Gollum Channel	FOS + 60M	31	32	1851.84	1.00
33	48.0979064	-14.6273868	FOS 60	Western End Goban Spur	FOS + 60M	32	33	98708.61	53 30
34	48.0833284	-14.6153696	FOS 60	Western End Goban Spur	FOS + 60M	33	34	1851.74	1.00
35	48.0688832	-14.6029975	FOS 60	Western End Goban Spur	FOS + 60M	34	35	1851.96	1.00
36	48.0545769	-14.5902751	FOS 60	Western End Goban Spur	FOS + 60M	35	36	1851.94	1.00
37	48.0404143	-14.5772069	FOS 60	Western End Goban Spur	FOS + 60M	36	37	1851.81	1.00
38	48.0263984	-14.5637951	FOS 60	Western End Goban Spur	FOS + 60M	37	38	1851.80	1.00
39	48.0170407	-14.5545155	FOS 60	Western End Goban Spur	FOS + 60M	38	39	1249.70	0.67

IRL-DOC-02-07_Sept_2005

Co-ordinates of Fixed Points used to define the Outer Limits of the Extended Shelf in the area abutting the Porcupine Abyssal Plain as plotted by CARIS LOTS and then selected manually

FP	Corresponding ID	Latitude	Longitude	Corresponding FOS Point	Base of Slope Region	Method	From FP	To FP	Distance (m)	Distance(M)
1	1	51.0376718	-17.4926083	FOS 46	Mouth of Rockall Trough	1% Sediment Thickness				
2	2	50.2478896	-16.7035439	FOS 50	Porcupine Bank	1% Sediment Thickness	1	2	104085.30	56.20
3	3	50.0691902	-16.5126452	FOS 51	Porcupine Bank	FOS + 60M	2	3	24107.61	13.02
4	4	50.0554937	-16.4979397	FOS 51	Porcupine Bank	FOS + 60M	3	4	1852.44	1.00
5	5	50.0419552	-16.4828907	FOS 51	Porcupine Bank	FOS + 60M	4	5	1851.16	1.00
6	6	50.0285778	-16.4675026	FOS 51	Porcupine Bank	FOS + 60M	5	6	1852.19	1.00
7	7	50.0153645	-16.4517798	FOS 51	Porcupine Bank	FOS + 60M	6	7	1852.39	1.00
8	8	50.0023213	-16.4357247	FOS 51	Porcupine Bank	FOS + 60M	7	8	1851.77	1.00
9	9	49.9894483	-16.4193439	FOS 51	Porcupine Bank	FOS + 60M	8	9	1851.66	1.00
10	10	49.9767514	-16.4026397	FOS 51	Porcupine Bank	FOS + 60M	9	10	1852.03	1.00
11	N/A	49.9642336	-16.3856211	FOS 51	Porcupine Bank	FOS + 60M	10	11	1852.06	1.00
12	N/A	49.9518981	-16.3682904	FOS 51	Porcupine Bank	FOS + 60M	11	12	1851.30	1.00
13	N/A	49.9397464	-16.3506497	FOS 51	Porcupine Bank	FOS + 60M	12	13	1851.87	1.00
14	N/A	49.9277843	-16.3327081	FOS 51	Porcupine Bank	FOS + 60M	13	14	1852.44	1.00
15	N/A	49.7118147	-16.0163304	FOS 53	Porcupine Bank	FOS + 60M	14	15	33096.75	17.87
16	N/A	48.8652140	-15.2474220	FOS 57	Northern Goban Spur	FOS + 60M	15	16	109516.02	59.13
17	33	48.0979064	-14.6273868	FOS 60	Western Goban Spur	FOS + 60M	16	17	96855.74	52.30
18	34	48.0833284	-14.6153696	FOS 60	Western Goban Spur	FOS + 60M	17	18	1852.03	1.00
19	35	48.0688832	-14.6029975	FOS 60	Western Goban Spur	FOS + 60M	18	19	1852.35	1.00
20	36	48.0545769	-14.5902751	FOS 60	Western Goban Spur	FOS + 60M	19	20	1851.25	1.00
21	37	48.0404143	-14.5772069	FOS 60	Western Goban Spur	FOS + 60M	20	21	1852.57	1.00
22	38	48.0263984	-14.5637951	FOS 60	Western Goban Spur	FOS + 60M	21	22	1851.18	1.00
23	39	48.0170407	-14.5545155	FOS 60	Western Goban Spur	FOS + 60M	22	23	1249.93	0.67

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Outer Limit Generation in CARIS LOTS

The final outer limit was generated by using the two points at which sediment thickness is 1% of the distance from the FOS and points which lie on the FOS + 60M envelope of arcs line. CARIS LOTS provides a Generate Outer Limit Markers tool which adds outer limit markers automatically. This is achieved by:
1. Selecting the FOS + 60M envelope of arcs line.
2. Choosing the Generate Outer Limit Markers command - this opens the Enter Radius dialog box (figure 1).
3. Entering a radius and selecting the units.

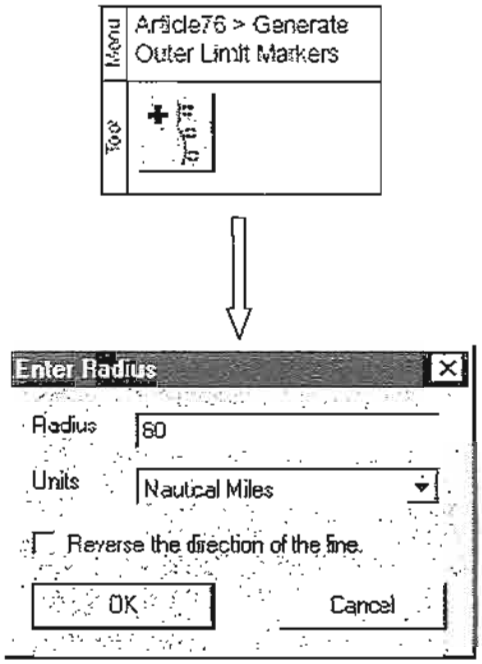

Figure 1. Outer limit marker generation tool.

The radius entered here is the maximum distance between two markers. CARIS LOTS places markers at points that are less than the specified distance apart and at locations where joining the two points with a straight line will not mean the loss of any territory.

Initially, a radius of 59.5M was used. A total of 37 points were generated by the CARIS tool on the FOS+60M envelope of arcs. The upper portion of the final outer limit is generated by a straight line drawn at which sediment thickness is 1% of the distance from the FOS. This yielded the solution in the figure below (figure 2).

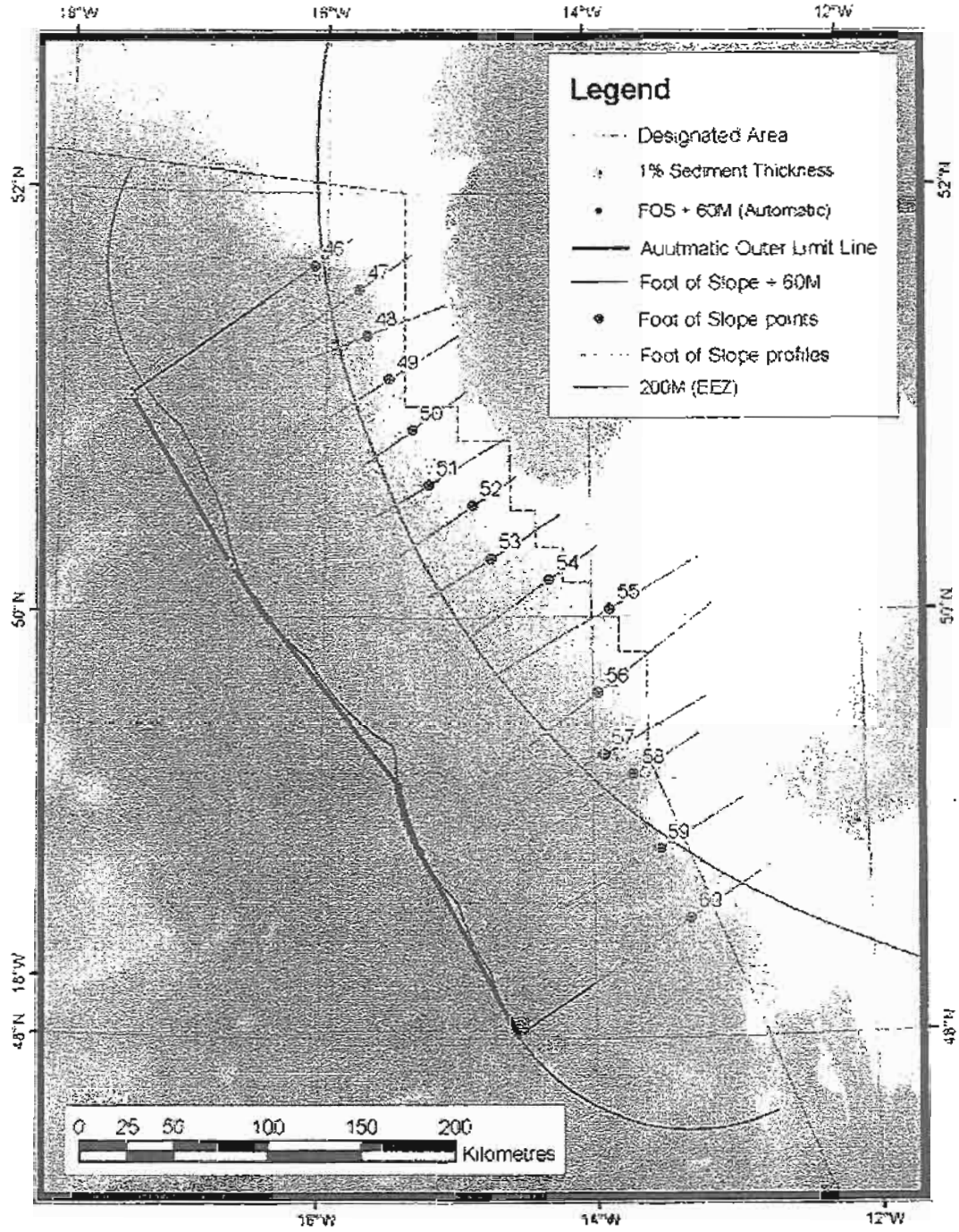

Figure 2. Final outer limit using 59.5M radius.

Following further examination, it was discovered that a more optimal solution could be achieved by entering a radius of 1M for the same FOS+60M envelope of arcs and manually selecting the most advantageous markers (figure 3). Markers that do not contribute have been discarded. A large number of short distance (1M) markers were chosen where outwardly curved portions of the outer limit line occurred. The greater number of points here prevented any territorial loss. Straight portions and portions that curve landward were spanned by fewer

points and longer lines, all less than 60M apart, to maximize the area (figure 4). This solution produces a total of 23 points (Fixed Point (FP) 1-23) defining the outer limit and comprises markers at which sediment thickness is 1% of the distance from the FOS and 21 FOS+60M markers (Table 1).

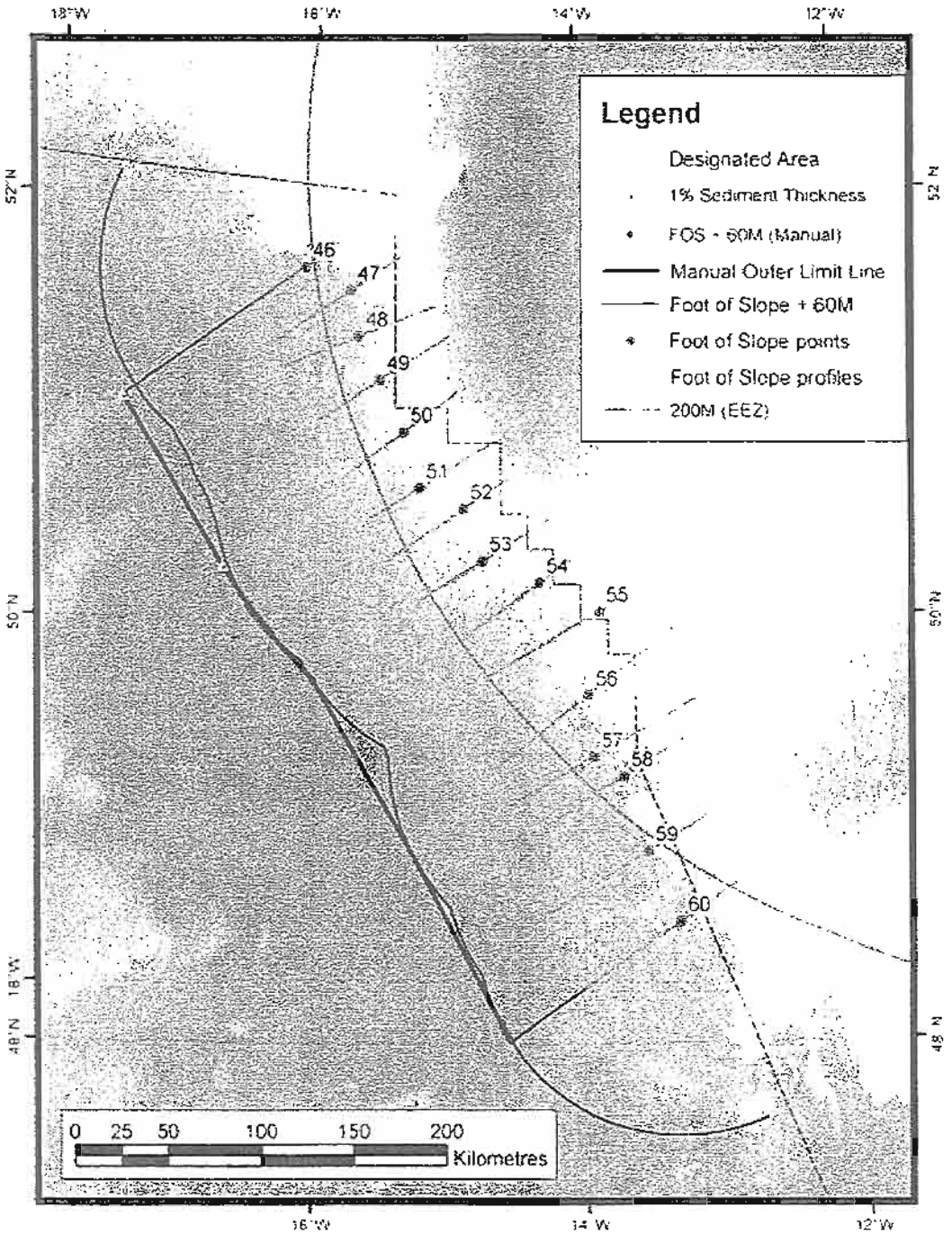

Figure 3. Final outer limit – manual solution using selected points at 1M radius.

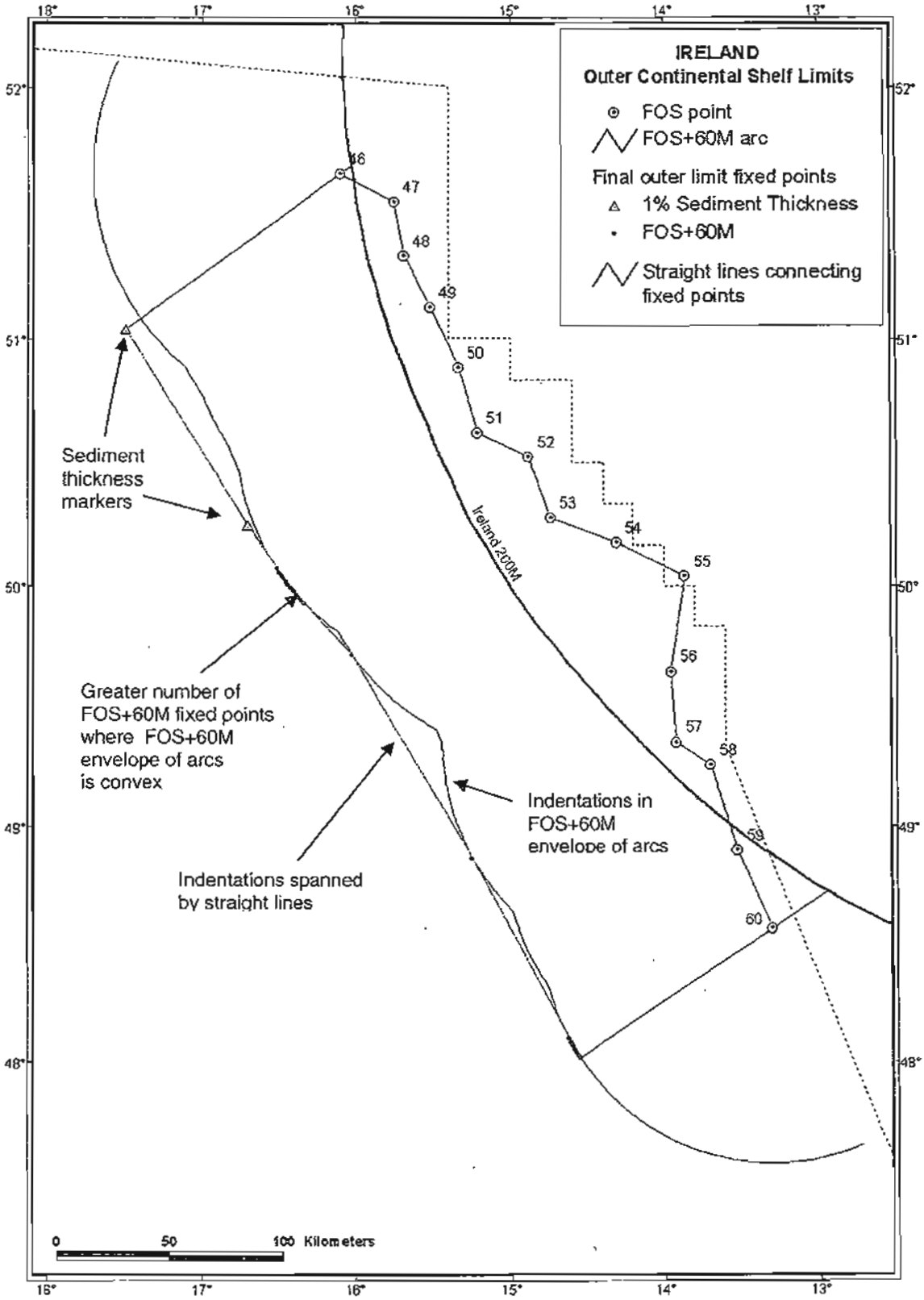

Figure 4. Final outer limit. Short straight line segments are used at outwardly curved convex portions of the FOS+60M envelope of arcs. Longer straight line segments are used to span portions where curvature is landward or concave.

Table 1. List of coordinates defining the outer limits of Ireland's extended continental shelf area abutting the Porcupine Abyssal Plain. All coordinates relate to the WGS84 geodetic reference system.

FP	Latitude (N)	Longitude (W)	Method	From ID	To ID	Distance (m)	Distance (M)
1	51.0376718	-17.4926083	1% Sediment Thickness				
2	50.2478896	-16.7035439	1% Sediment Thickness	1	2	104085.30	56.20
3	50.0691902	-16.5126452	FOS + 60M	2	3	24107.61	13.02
4	50.0554937	-16.4979397	FOS + 60M	3	4	1852.44	1.00
5	50.0419552	-16.4828907	FOS + 60M	4	5	1851.16	1.00
6	50.0285778	-16.4675026	FOS + 60M	5	6	1852.19	1.00
7	50.0153645	-16.4517798	FOS + 60M	6	7	1852.39	1.00
8	50.0023213	-16.4357247	FOS + 60M	7	8	1851.77	1.00
9	49.9894483	-16.4193439	FOS + 60M	8	9	1851.66	1.00
10	49.9767514	-16.4026397	FOS + 60M	9	10	1852.03	1.00
11	49.9642336	-16.3856211	FOS + 60M	10	11	1852.06	1.00
12	49.9518981	-16.3682904	FOS + 60M	11	12	1851.30	1.00
13	49.9397464	-16.3506497	FOS + 60M	12	13	1851.87	1.00
14	49.9277843	-16.3327081	FOS + 60M	13	14	1852.44	1.00
15	49.7118147	-16.0163304	FOS + 60M	14	15	33096.75	17.87
16	48.8652140	-15.2474220	FOS + 60M	15	16	109516.02	59.13
17	48.0979064	-14.6273868	FOS + 60M	16	17	96855.74	52.30
18	48.0833284	-14.6153696	FOS + 60M	17	18	1852.03	1.00
19	48.0688832	-14.6029975	FOS + 60M	18	19	1852.35	1.00
20	48.0545769	-14.5902751	FOS + 60M	19	20	1851.25	1.00
21	48.0404143	-14.5772069	FOS + 60M	20	21	1852.57	1.00
22	48.0263984	-14.5637951	FOS + 60M	21	22	1851.18	1.00
23	48.0170407	-14.5545155	FOS + 60M	22	23	1249.93	0.67

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GENERATION OF PROFILES

The foot of the continental slope was determined on 2D profiles from a 3D bathymetric grid in CARIS LOTS. The 3D bathymetric grid was generated using bathymetric data acquired during the PAD 1996 bathymetry survey.

The first stage of profile generation is the creation of a regular gridded Digital Terrain Model (DTM) dataset from the ASCII XYZ bathymetric data.

CARIS LOTS Regular Gridded Digital Terrain Model

A DTM can represent the terrain as a regular grid of points. The original data points are needed to calculate the elevations for the grid points; after this, they can be discarded. The height of any point in the DTM can be interpolated by finding the four closest neighbours of the cell in which the point falls (figure 1).

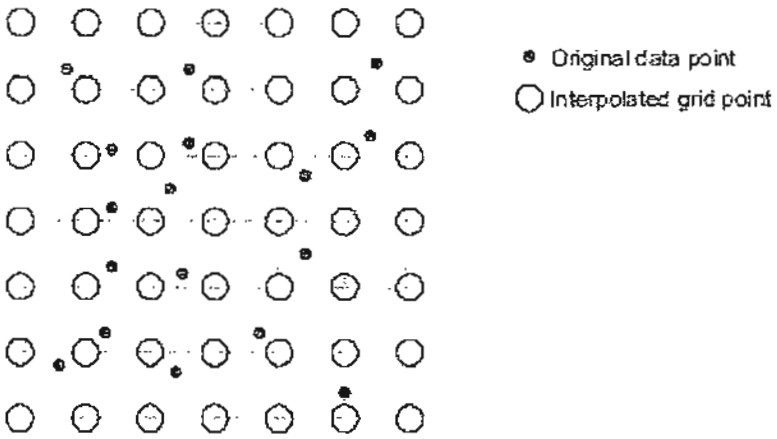


Figure 1. CARIS DTM interpolation structure.

CARIS LOTS makes an interpolated, regularly gridded DTM network by first mapping the 3D data onto an internal grid. For each grid cell, the elevation for a triangle vertex is interpolated using a weighted mean function, based on the elevation of the 3D point as well as its distance from neighbouring grid points. The result is that two triangles are created from the 3D data in each cell and the locations of the triangle vertices are then determined and written out at regular intervals.

From ASCII XYZ to CARIS Regular Gridded DTM

The PAD 1996 ASCII data was converted to a bathymetric grid by using the CARIS ASCII Data Importer tool (figure 2). This tool allows ASCII XYZ data to be imported as chart information and used to create a regular gridded DTM. This is then used by CARIS LOTS to create a shaded elevation raster image.

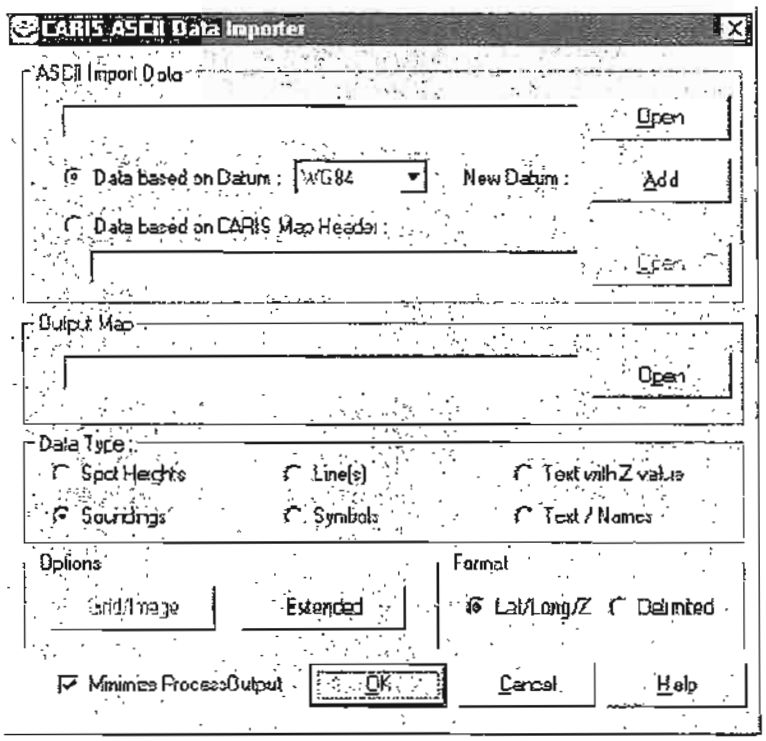


Figure 2. CARIS LOTS ASCII import tool

The basic procedure for importing ASCII data is as follows:
1. The XYZ data input file is selected by entering the file name and path or by navigating to the file location using the 'Open' button.
2. The correct datum for the XYZ data (WGS 1984) is selected.
3. The output file is selected by typing the file name and path or by navigating to the file location using the 'Output Map' button.
4. The correct data type for the XYZ data file is assigned ('Soundings').
5. As the data type is soundings, a raster image of the elevations or Z data can be created from a CARIS generated DTM with even cell spacing. Selecting the 'Grid' option opens a new dialog box (figure 3).

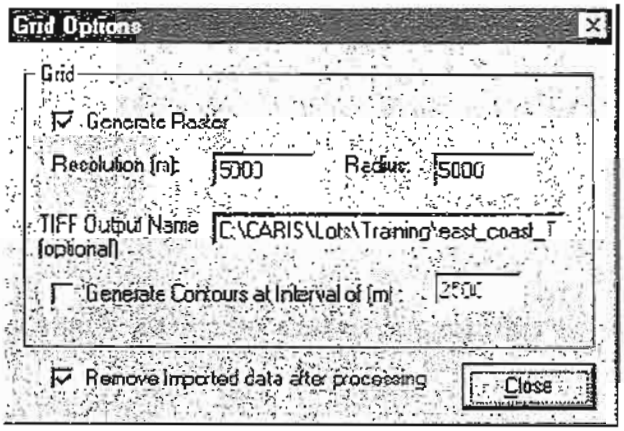


Figure 3. CARIS LOTS Grid Options dialog box.

To enable raster generation, the 'Generate Raster' box is ticked. Resolution and radius are then selected. The resolution specifies the dimension of each cell. By specifying the cell size, precise control over the size of the DTM triangles generated is maintained. Resolution in this case was set to units corresponding to 100 metres on the ground. The Z value of a triangle vertex is interpolated from the 3D points that fall within a circle centred on the vertex. The radius of that circle is defined in metres. A large radius results in a smoother DTM because more 3D points will be interpolated for each triangle. The radius here was set to 500m.

6. As delimitation of the each column in the XYZ data file is necessary, the 'Modify Column Definitions' option is chosen. This expands the dialog box is to show the options for parsing a text file into CARIS LOTS (figure 4).

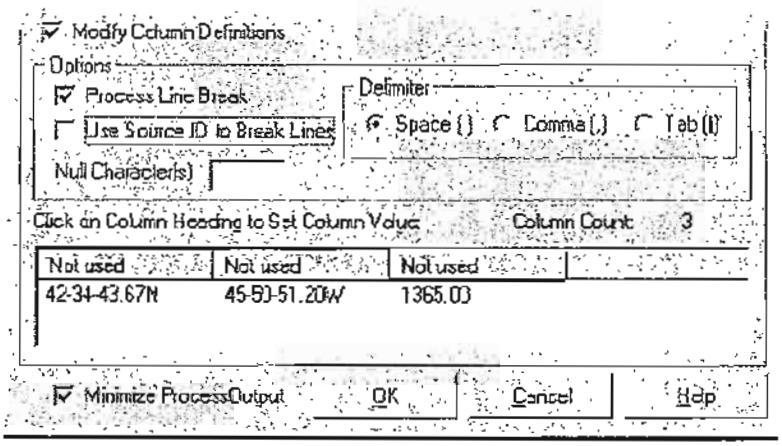


Figure 4. Expanded ASCII import tool – delimiter options.

When the correct separator is selected ('Space' in this case), the importer automatically assigns the character as a delimiter. The three columns are then assigned values of longitude (X), latitude (Y), and elevation (Z) by selecting them from the column heading.

FOS profile generation

Following creation of the raster image of elevations, Foot of Slope profiles can be generated using CARIS LOTS . As recommended in the CLCS Guidelines (5.4.8), the foot of the continental slope profiles are geodesic lines that are usually selected perpendicular, or near to perpendicular, to the continental margin at a given point. The depth information is derived from the raster grid image already generated, and displayed under the profile.

To generate profiles in CARIS LOTS, the raster image that contains depth data is selected using the appropriate menu item (figure 5).

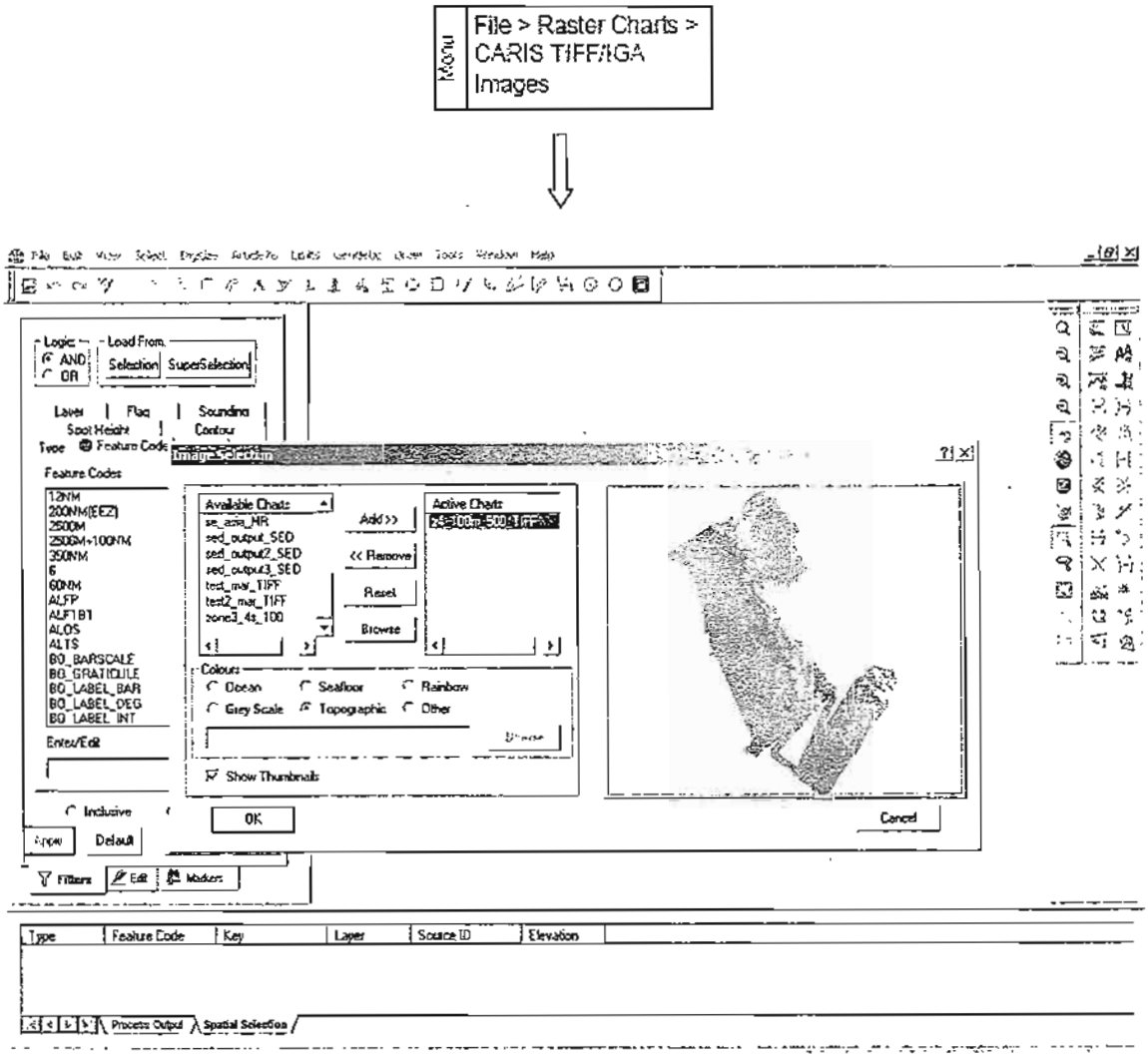


Figure 5. Loading a raster dataset into CARIS file.

CARIS LOTS displays the seafloor as a height colour-coded image. Colours depend on the colour map chosen when the image was selected (figure 6).

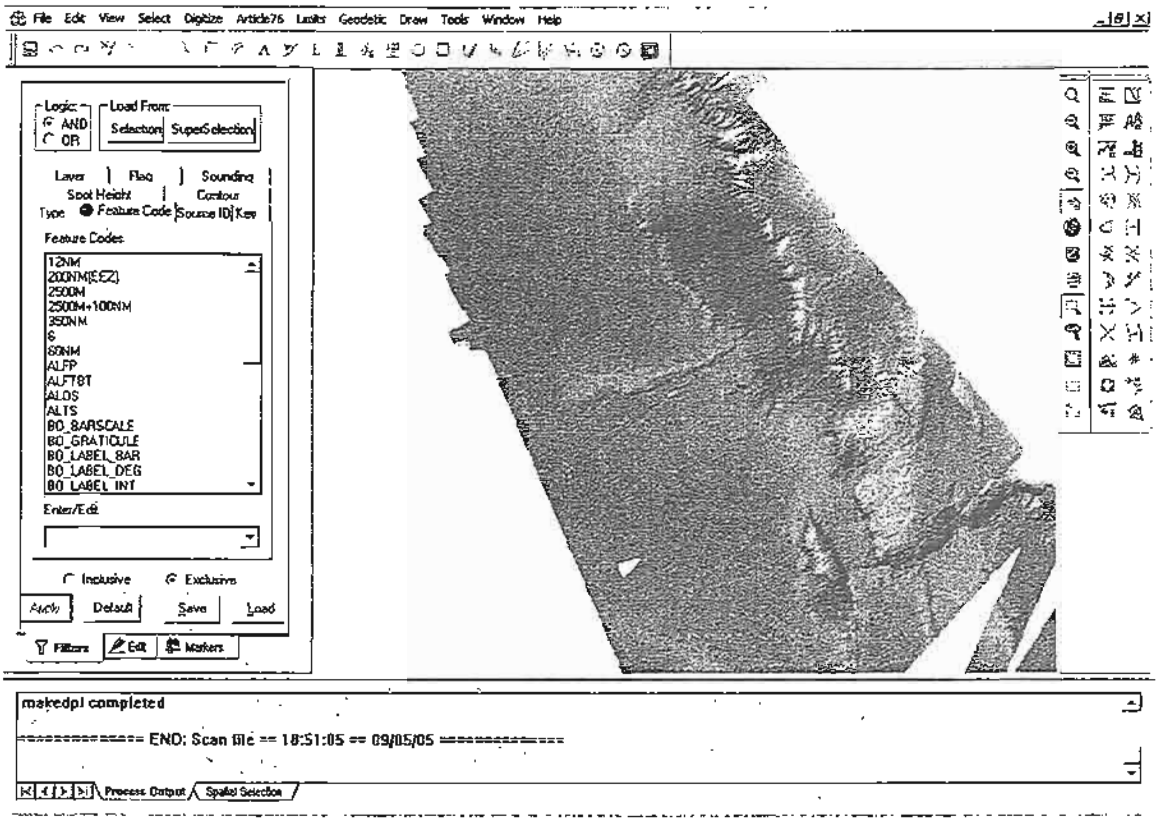


Figure 6. CARIS LOTS seafloor display with 'Topographic' colour map.

Once the area in which the foot of the slope is most likely to be found is determined i.e. base of slope region, a profile can be created in that area by choosing the Create FOS Profile Line command (figure 7).

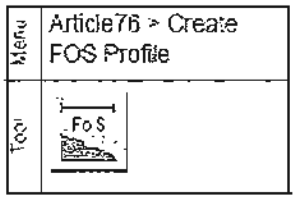


Figure 7. CARIS LOTS Create FOS Profile tool.

The start point of the profile is chosen on the continental shelf. A "rubber band" line is drawn between the start point and the mouse pointer. The end point of the profile is selected near the start of the abyssal plain. This creates a geodesic profile line on the display (figure 8).

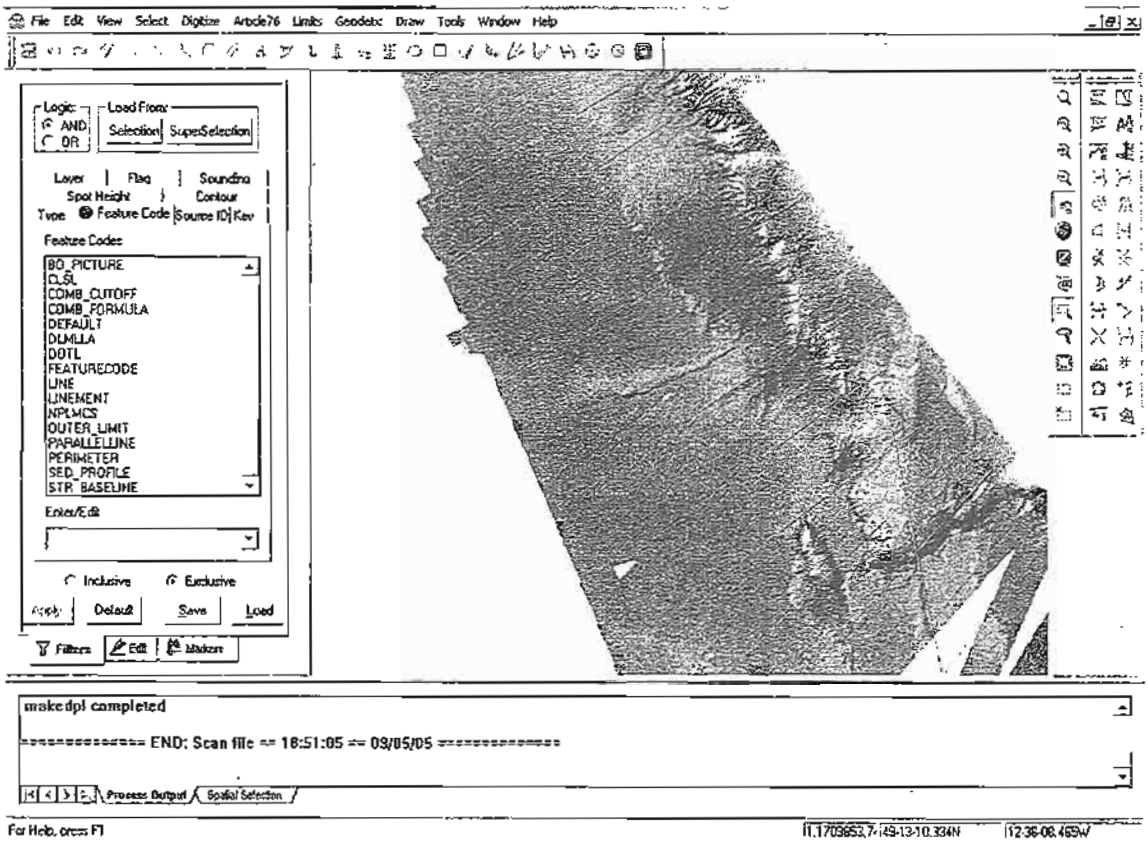


Figure 8. A series of FOS profiles line drawn on a base raster dataset.

To analyse the foot of the slope mathematically in CARIS LOTS , the FOS profile created as described above is selected. The Analyze Foot of the Slope command is chosen (figure 9) – this opens the Foot of Slope profile dialog box (figure 10). The software displays the profile graphically with land to the left and deep water to the right

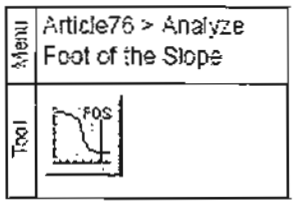


Figure 9. CARIS LOTS Analyze Foot of Slope tool.

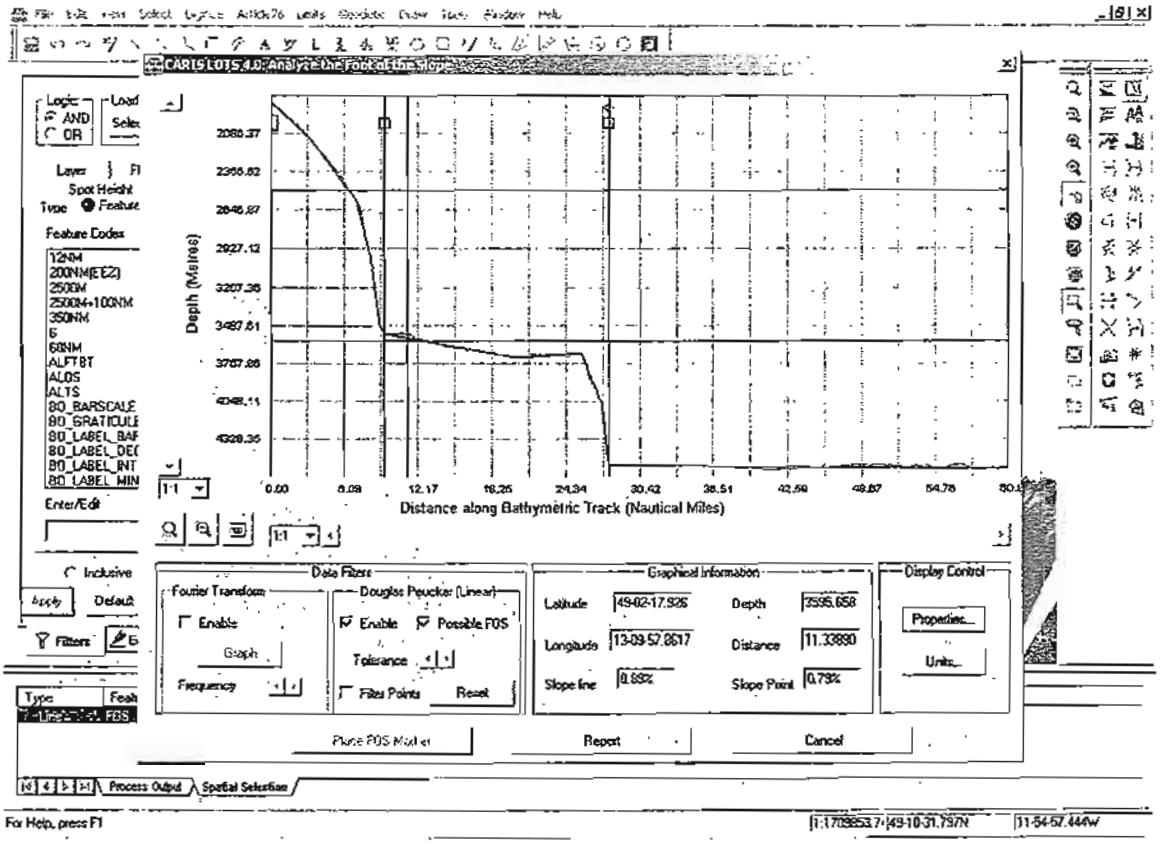


Figure 10. FOS profile dialog box.

The scale of the horizontal and vertical axes can be adjusted from 1:1 to 1:10, although for this submission they have all been kept at 1:1. The profile dialog box displays information on the data filter, graphical information and display controls. The profile dialog box allows the user to place the foot of the continental slope marker and generate a report. Two filters exist within CARIS LOTS to aid in identifying the foot of the continental slope: the Fourier Transform filter which analyses the slope using the second derivative to identify the points of maximum change and the Douglas-Peucker filter. The Douglas-Peucker filter uses an algorithm which is a generally accepted mathematical method for simplifying a line of points while retaining the basic shape of the line. The use of the Douglas-Peucker filter allows for the point of maximum change in gradient to be determined mathematically in accordance with CLCS Guidelines. The filter allows the user to adjust the tolerance of a simplified line to give a satisfactory approximation of the abyssal plain, rise, slope and shelf.

The Douglas-Peucker Algorithm (figure 11) works by connecting two endpoints of a polyline (black) with a straight line as the first approximation of the polyline (red line in step 1). This initial trend line approximates the trend of the more complex polyline. How well it approximates the whole polyline is determined by computing the deviation of the new trend line from the original polyline from all intermediate polyline vertices to that (finite) line segment. These distances are calculated against a specified tolerance. When the approximations exceed the tolerance the

trend line snaps to the appropriate polyline vertex (point a in step 2). This creates two new trend lines (blue line in step 2) more closely approximating the polyline. The process is repeated as long as the tolerance distance is exceeded from the trend line to the polyline (Step 3). In step 4 the four new trend lines resemble the original polyline within the assigned tolerance.

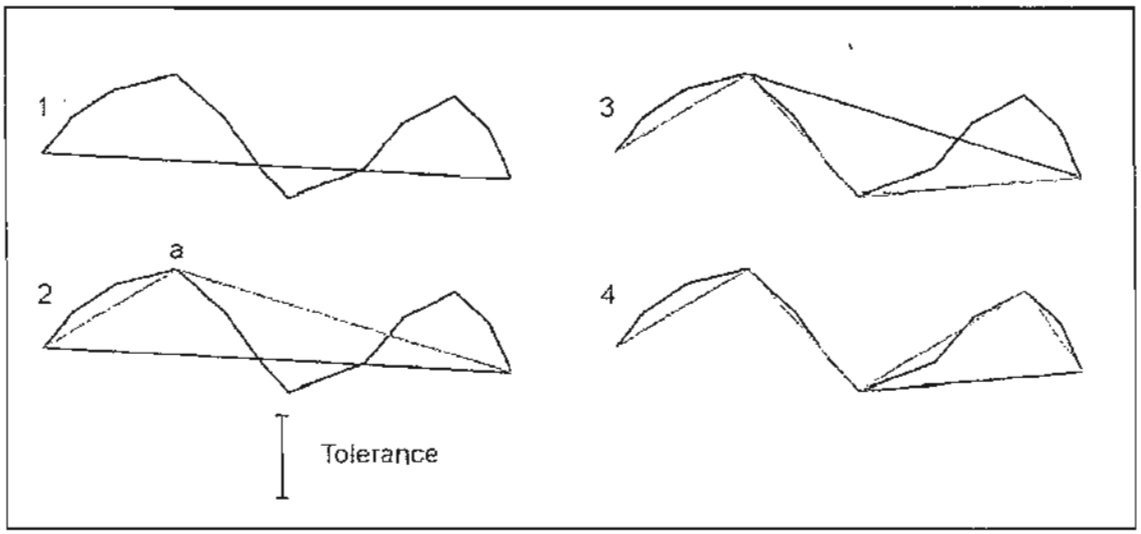


Figure 11. Steps of Douglas-Peucker algorithm.

For the foot of slope analyses, the Douglas-Peucker filter was applied and the tolerance was decreased so that the resulting line closely approximated the original bathymetric profile while ensuring that small perturbations in the profile are not represented. CARIS LOTS automatically generates multiple potential foot of slope markers from which the final foot of slope point is selected. These points are chosen in accordance with the principles laid out in the CLCS Guidelines (5.4.5). In all cases the foot of slope selected was derived mathematically from the CARIS LOTS Douglas-Peucker filter.

CARIS LOTS generates a graphical representation of the profile, on which the Douglas-Peucker filter may be turned off or on. These profiles are given in Appendix 3.8 of the main Submission. For each profile the upper diagram shows the profile with the Douglas-Peucker filter on, while the lower diagram shows the profile with the filter off. The upper diagram also shows the automatically generated foot of slope potential markers as vertical bold blue lines (figure 9). On both profiles (filter on and off) the selected foot of slope point is indicated by a red dot. The program also automatically generates a text file with identifying information, datum information, a time stamp, comments, coordinates and depth for the selected foot of slope point, original profile points and Douglas- Peucker filter points. The complete text files are given in the digital data accompanying this submission. An edited version of the text files (with all but first and last original profile points deleted) are given with the foot of slope profile images in Appendix 3.8.

Coordinates of Foot of Slope (FOS)
(with ID and FP points generated from each)

All coordinates relate to the WGS 84 geodetic reference system.

FOS Point	Latitude (N)	Longitude (W)	ID Points	FP Points
FOS46	51.65841301	-16.09671619	ID 1	FP 1
FOS47	51.54741947	-15.74599818	N/A	N/A
FOS48	51.33017832	-15.68313183	N/A	N/A
FOS49	51.12526740	-15.51648761	N/A	N/A
FOS50	50.88480239	-15.33589929	ID 2	FP 2
FOS51	50.62316217	-15.21351281	ID 3 TO ID 10	FP 3 TO FP 14
FOS52	50.52392851	-14.88326741	N/A	N/A
FOS53	50.27943098	-14.74099224	N/A	FP 15
FOS54	50.17672294	-14.30684095	N/A	N/A
FOS55	50.03761461	-13.86159323	N/A	N/A
FOS56	49.64175121	-13.95187391	N/A	N/A
FOS57	49.34822306	-13.91514629	ID 11 TO ID 32	FP 16
FOS58	49.25501839	-13.69829074	N/A	N/A
FOS59	48.89812122	-13.52787134	N/A	N/A
FOS60	48.56619382	-13.30341155	ID 33 TO ID 39	FP 17 TO FP 23

Point Number	Chart Number	Scale	WGS84 Latitude (N)	WGS84 Longitude (W)	Location
6	1883	1:30,000	55°04'30"	08°28'57"	Stag Rocks
14	2703	1:50,000	54°16'54"	10°05'38"	Eagle Island
15*	2704	1:50,000	54°03'43"	10°21'02"	Blacksod Bay
17	2707	1:25,000	53°36'19"	10°19'14"	Kimmeen Rocks, Inishark
32*	2790	1:37,500	52°04'37"	10°41'01"	Tearaght Rocks West, Inistearaght
33*	2790	1:37,500	52°01'19"	10°41'19"	Great Foze Rock
34*	2495	1:60,000	51°45'49"	10°32'43"	Washerwoman Rock, Great Skellig
35*	2495	1:60,000	51°35' 32"	10°18'31"	Gull Rock, Dursey Island
36 *	2495	1:60,000	51°34'14"	10°14'50"	Calf Rock, Dursey Island
37 *	2184	1:30,000	51°26'56"	09°49'14"	Mizen Head
38	2184	1:30,000	51°25'14"	09°30'50"	Bream Point, Cape Clear

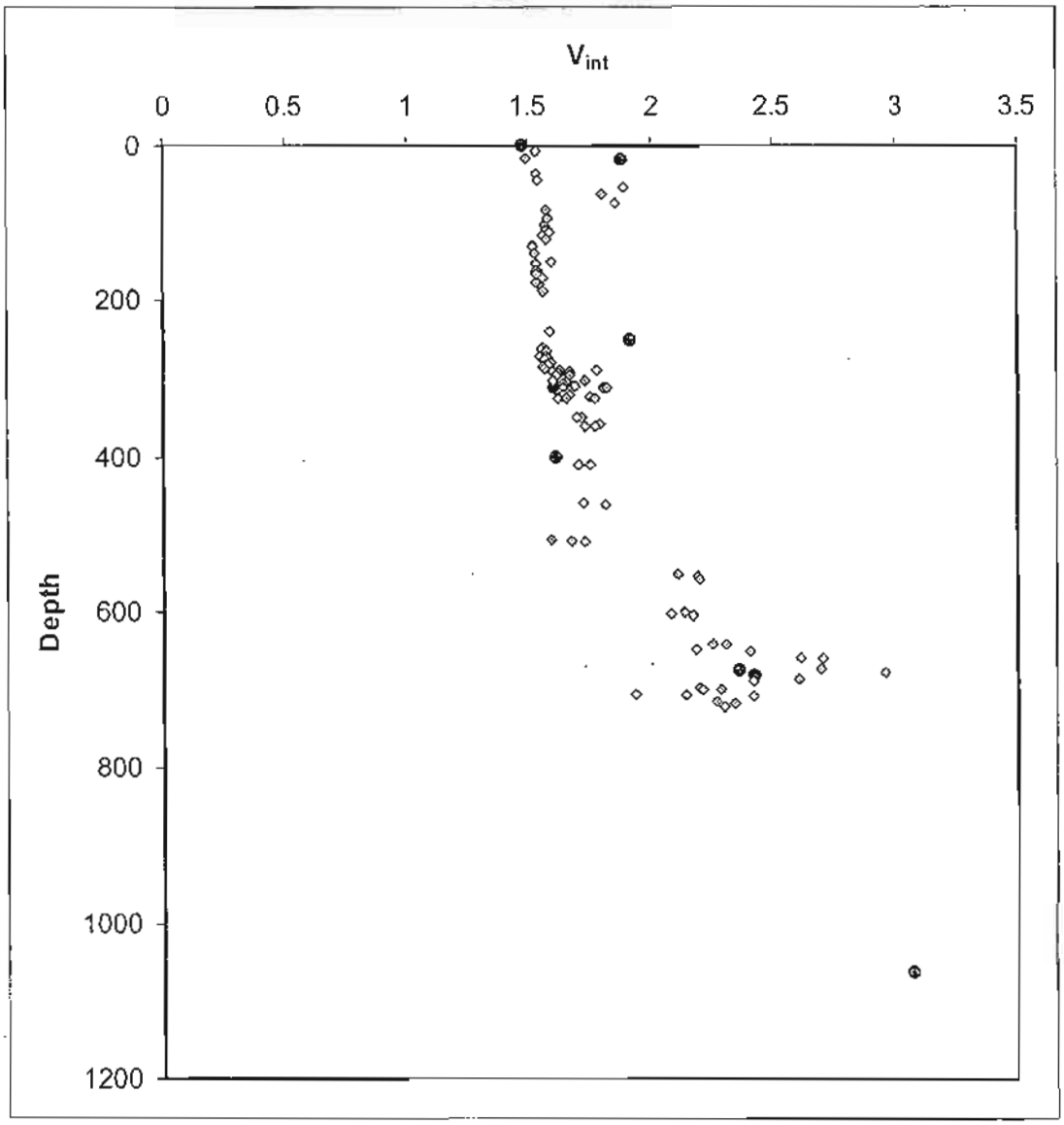
Table 3.2: Basepoints, given in WGS 84 coordinate system, used in calculating the 200 and 350M limit (indicated with star), shown with source British Admiralty Chart number and scale.

Question 10c

An analysis of the accuracy of the velocity data used for the establishment of the fixed points at each of which the thickness of the sedimentary rocks is at least 1% of the shortest distance from such point to the foot of the continental slope was carried by comparing the velocities established in DSDP Site 610 (Leg 94; http://www.ngdc.noaa.gov/mgg/geology/dsdp/data/94/610/index.htm) with the seismic line PAD95-09. PAD95-09 is located further northwest in the Rockall Trough and is not included as part of this Submission. However all the PAD seismic data was acquired by the same contractor for the Continental Shelf Delineation Project as specified in Part III, Section 2.2.2.1 of the Submission. DSDP Site 610 intersected mainly calcareous ooze and mud along with minor chalk and limestone. Down-hole sonic velocities with depths are given in Table 1.

The CDP located closest to the location of the drill site was chosen for the velocity analysis. The seafloor and base sediment pick TWTT for the SPN located at the drill site was entered into the interval velocity analysis table for the CDP and the Dixvel program outlined in Part III, Section 3.3.4.3 was run to establish interval velocities. The results are shown in Table 2.

The interval velocities derived from the CDP stacking velocities and Dixvel analysis were plotted against the measured down-hole velocities to assess their accuracy. From the plot shown below it can be seen that the velocities calculated (black circles) show a relatively good match to the measured velocities measured down-hole (grey diamonds). The shallower values appear to be somewhat high but quickly fall in line with the observed velocities. The deepest calculated velocity would appear to be supported by data published by Masson and Kidd (1984).



Plot of interval velocities from seismic profile PAD95-09 (black circles) against sonic velocities from DSDP Leg 94 Site 610 (grey diamonds).

Table 1: Sonic velocity data for DSDP Site 610.

DSDP (Leg&Site)	Depth (m)	Velocity (s)
94610	5.76	1.532
94610	15.31	1.489
94610	36.07	1.531
94610	45.67	1.542
94610	150.75	1.593
94610	160.35	1.536
94610	169.95	1.561
94610	179.55	1.547
94610	238.65	1.591
94610	302.15	1.602
94610	348.7	1.718
94610	348.7	1.698
94610	359.31	1.797
94610	360.71	1.771
94610	361.4	1.735
94610	408.99	1.751
94610	410.49	1.703
94610	458.46	1.723
94610	461.06	1.813
94610	506.53	1.598
94610	509.23	1.677
94610	509.23	1.73
94610	550.95	2.11
94610	553.95	2.195
94610	556.95	2.199
94610	599.35	2.141
94610	601.95	2.082
94610	605.4	2.174
94610	639.43	2.313
94610	639.81	2.254
94610	647.07	2.191
94610	648.36	2.409
94610	657.12	2.617
94610	658.24	2.709

DSDP (Leg&Site)	Depth (m)	Velocity (s)
94610A	54.65	1.889
94610A	63.36	1.802
94610A	73.86	1.855
94610A	83.31	1.572
94610A	93.09	1.579
94610A	102.69	1.567
94610A	108.75	1.575
94610A	111.81	1.59
94610A	115.35	1.563
94610A	119.85	1.573
94610A	129.4	1.522
94610A	139.05	1.523
94610A	151.65	1.534
94610A	161.25	1.535
94610A	166.35	1.533
94610A	175.95	1.535
94610A	187.05	1.558
94610E	260.75	1.559
94610E	262.25	1.553
94610E	263.75	1.574
94610E	270.35	1.544
94610E	271.85	1.572
94610E	273.35	1.579
94610E	274.85	1.567
94610E	279.95	1.592
94610E	281.45	1.572
94610E	282.95	1.578
94610E	284.45	1.561
94610E	285.95	1.569
94610E	287.7	1.781
94610E	289.55	1.627
94610E	291.05	1.602
94610E	291.51	1.674
94610E	292.75	1.632

Table 1 continued...

DSDP (Leg&Site)	Depth (m)	Velocity (s)
94610	672.75	2.697
94610	675.21	2.96
94610	685.6	2.607
94610	687.8	2.424
94610	695.75	2.2
94610	698.13	2.217
94610	699.51	2.291
94610	704.3	2.148
94610	705.8	1.942
94610	706.85	2.424
94610	714.15	2.272
94610	716.7	2.348
94610	720.05	2.304

DSDP (Leg&Site)	Depth (m)	Velocity (s)
94610E	293.95	1.623
94610E	295.86	1.613
94610E	296.18	1.67
94610E	302.85	1.733
94610E	304.19	1.659
94610E	307.11	1.641
94610E	308.08	1.691
94610E	310.94	1.812
94610E	311.1	1.821
94610E	311.73	1.646
94610E	318.95	1.629
94610E	319.33	1.673
94610E	321.05	1.643
94610E	323.46	1.753
94610E	323.73	1.776
94610E	325	1.624
94610E	325.35	1.66

Table 2: velocity analysis for CDP 8010 of Seismic Line PAD95-09

LINE PAD95-09 CDP 8010 SPN 2684				
TIME	V_{RMS} (ms)	V_{INT} (ms)	V_{AVG} (s)	Z
0	1480	1480	1480	0
3230	1480	1480	1480	2390
3248	1483	1884	1482	2407
3492	1517	1918	1513	2641
3568	1519	1610	1515	2702
3678	1522	1615	1518	2791
3908	1585	2371	1568	3064
3913	1586	2427	1569	3070
4162	1712	3076	1659	3453
4421	1779	2631	1716	3794
4733	1850	2660	1778	4208
4972	1967	3564	1864	4634
5001	1981	3677	1875	4688
5491	2187	3680	2036	5589
5910	2371	4076	2180	6443
6268	2695	5862	2391	7492
6738	2881	4704	2552	8598
7512	3391	6273	2935	11026
8672	4529	8881	3731	16177
10000	5762	10773	4666	23330

Further Comment Regarding Q.9 and Q.12 of the Subcommission to Ireland

Base of Slope Regions and Methodology for Identifying Foot of Slope Points

The base of slope regions identified in the Submission of Ireland were identified as per CLCS Guidelines 3.4.6. The base of slope regions defined on the basis of morphology were done so as the margin appeared to follow the so-called 'ideal picture'.

The criteria used to define the base of slope region defined on the basis of geophysics have been outlined in documents IRL-LETT-02-08_Sept_2005 and Part III sections 3.3.2.1 to 3.3.2.3. The diagram below (Fig. 1) illustrates the examples where geology and geophysics were used to define the base of slope region (examples 2, 3 & 4). In each of these examples the base of slope region may exist in multiple locations (indicated by boxes) and geology and geophysics was used to identify which region was appropriate to conduct the search for the foot of slope. Since only one base of slope region was considered for example 1 (Porcupine Bank and North Goban Spur), this was categorized as a base of slope region defined by morphology.

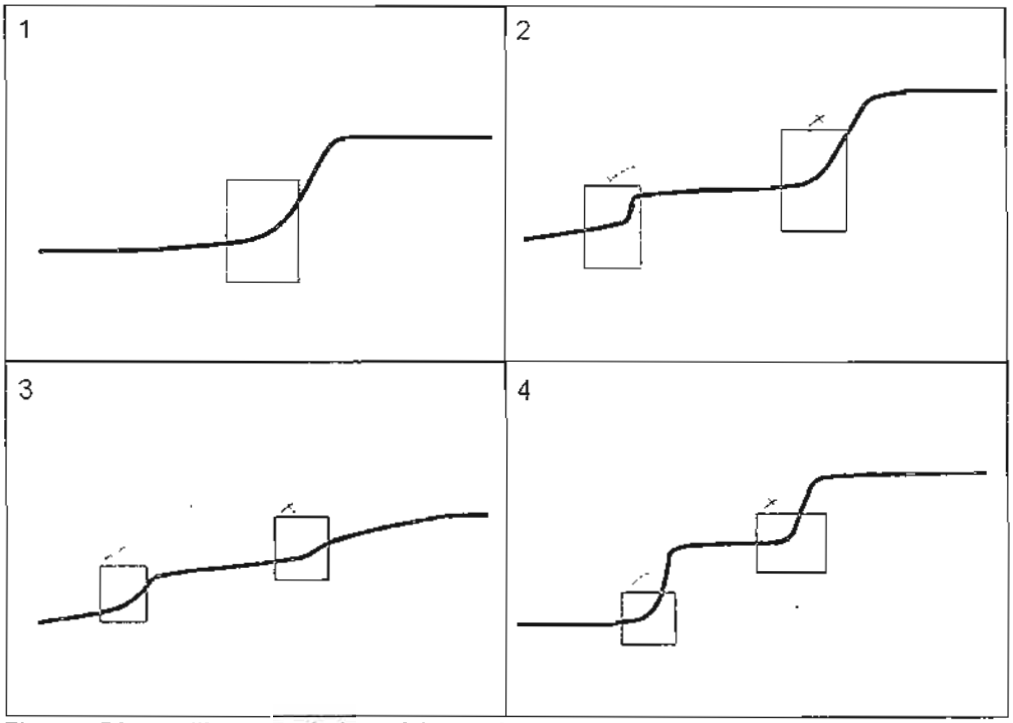


Figure 1: Diagram illustrating the base of slope regions along the Irish continental margin. Example 1: Base of slope region characterized on morphology (Porcupine Bank and North Goban Spur). Example 2: Base of slope region for Mouth of the Rockall Trough – Geology and geophysics was used to establish the base of slope in the lower region. Example 3: Base of slope region for Gollum Channel Region – Geology and geophysics was used to establish the base of slope in the lower region. Example 4: Base of slope region for the Western Edge of the Goban Spur – Geology and geophysics was used to establish the base of slope in the lower region.

In the profiles analysed here, it is clear that the margins are somewhat more complicated than the 'ideal picture' of the CLCS Guidelines even though the initial base of slope region can be defined on the basis of morphology. The profiles here

represent a 'two-segment' slope that has been described by other workers (e.g. Antunes and Pimentel, 2003) and represents a challenge to the strictest interpretation of the 'maximum change in gradient' provision of Article 76 of UNCLOS. For a two-segment slope, the slope can be considered in terms of an upper slope (with generally a steeper gradient) and a lower slope (with a shallower gradient, although steeper than the rise where one is developed). The gradient of the lower slope in all the cases analyzed below is typically 2 – 4° (see Appendix 3.8 text files for gradients), which is too steep for the rise. As such, a certain amount of flexibility is required, within the boundaries of Article 76, to adequately define the foot of slope point.

It is Ireland's interpretation of the 'evidence to the contrary' provision that in such instances the foot of slope would be located where there is no change in gradient and/or the maximum change in gradient does not occur in the base of slope region and therefore geology and geophysics is exclusively required for the location of the foot of slope points (i.e. no morphological criteria whatsoever is used). Clearly, this is not the case for any of the Irish foot of slope selections. Geology and geophysics are used to define the appropriate base of slope region or to aid in refining the base of slope region.

Analysis of the foot of slope profiles in the base of slope regions defined by morphology showed that the location of the foot of slope point was not as straightforward as the 'ideal picture'. Significant variation in the margin profile with local maxima and other features meant that the base of slope region was refined during the process of analysing the foot of slope profiles (Fig. 2). Although not explicitly stated in the submission, this refinement was a result of the methodology employed in establishing the foot of slope points. This refinement was done purely on the basis of morphology and is considered to be the most accurate assessment of the location of the foot of slope point as outlined in Article 76 of UNCLOS and the CLCS Guidelines.

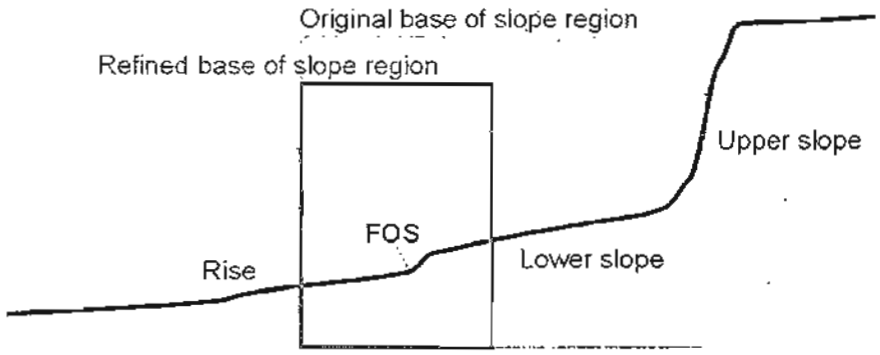


Figure 2: Diagram illustrating the refinement of the base of slope region in areas where base of slope was defined on the basis of morphology.

With regard to the 9th September 2005 presentation by Mr. Pimentel to the delegation of Ireland on the maximum change in gradient at the base of the

continental slope, we have endeavoured to reproduce his results and re-examine our FOS points accordingly.

It should first be pointed out that the methodologies used in the Irish Submission differ significantly from those outlined by Mr. Pimentel. The methodology used in the Irish Submission is given in detail in section 3.3.3 of Part III of the Submission of Ireland and in document IRL-DOC-004-07_Sept_2005. The methodology described by Mr. Pimentel is purely mathematical and provides an assessment of slope of slope and profile curvature of the bathymetric grid for the submission area. The methodology used by Ireland provides multiple possibilities for the Foot of Slope point on a given profile based on changes in gradient above a threshold. Ireland chose the change in gradient that most adequately described the foot of slope. In doing so a number of local maximum changes in gradient were disregarded. A minimal amount of interpretation is required in this procedure but it does not involve the use of any geological or geophysical evidence (although where such evidence is available, it is presented to further justify the selection). This procedure is outlined in document IRL-LETT-03-09_Sept_2005. In particular this document outlines the justification for disregarding local maximum change in gradients (as prescribed in CLCS Guideline 5.4.12).

To reconcile these results with the analysis presented by Mr. Pimentel, Ireland has created profiles on the slope of slope and profile curvature grids in the same location as those used for the CARIS LOTS analysis.

METHODOLOGY

The grids shown by Mr. Pimentel were reproduced using ESRI ArcGIS 8.3. The analysis was performed on the PAD/GSI/GEBCO 1km bathymetric grid contained in the GIS data contained in the Irish submission. The details below are modified from the 'Help' documentation provided with the software.

SLOPE

The slope identifies the maximum rate of change in value from each cell to its neighbours. An output slope grid can be calculated as a percentage slope or a degree of slope.

Conceptually, the slope function fits a plane to the z values of a 3-x-3 cell neighbourhood around the processing or centre cell. The direction the plane faces is the aspect for the processing cell. The slope for the cell is calculated from the 3-x-3 neighbourhood using the average maximum technique. If there is a cell location in the neighbourhood with a no-data z value, the z value of the centre cell will be assigned to the location. At the edge of the grid, at least three cells (outside the grid's extent) will contain no-data as their z values. These cells will be assigned the centre cell's z value. The result is a flattening of the 3-x-3 plane that is fit to these edge cells, which thus usually leads to a reduction in the slope.

The algorithm that is used to calculate slope is:

```
rise_run = SQRT(SQR(dz/dx)+SQR(dz/dy))
```

```
degree_slope = ATAN(rise_run) * 57.29578
```

where the deltas are calculated using a 3-x-3 roving window.

a through i represent the z_values in the window:

```
a b c
d e f
g h i

(dz/dx) = ((a + 2d + g) - (c + 2f + i)) / (8 * x_mesh_spacing)
(dz/dy) = ((a + 2b + c) - (g + 2h + i)) / (8 * y_mesh_spacing)
```

The slope of a function at a particular point can be computed as the first-order derivative of the function (at that point). The "slope of the slope" is the second-order derivative of the slope, i.e. rate of change of the slope at each respective point. The slope of slope for the Irish partial submission area is shown below (Fig. 3).

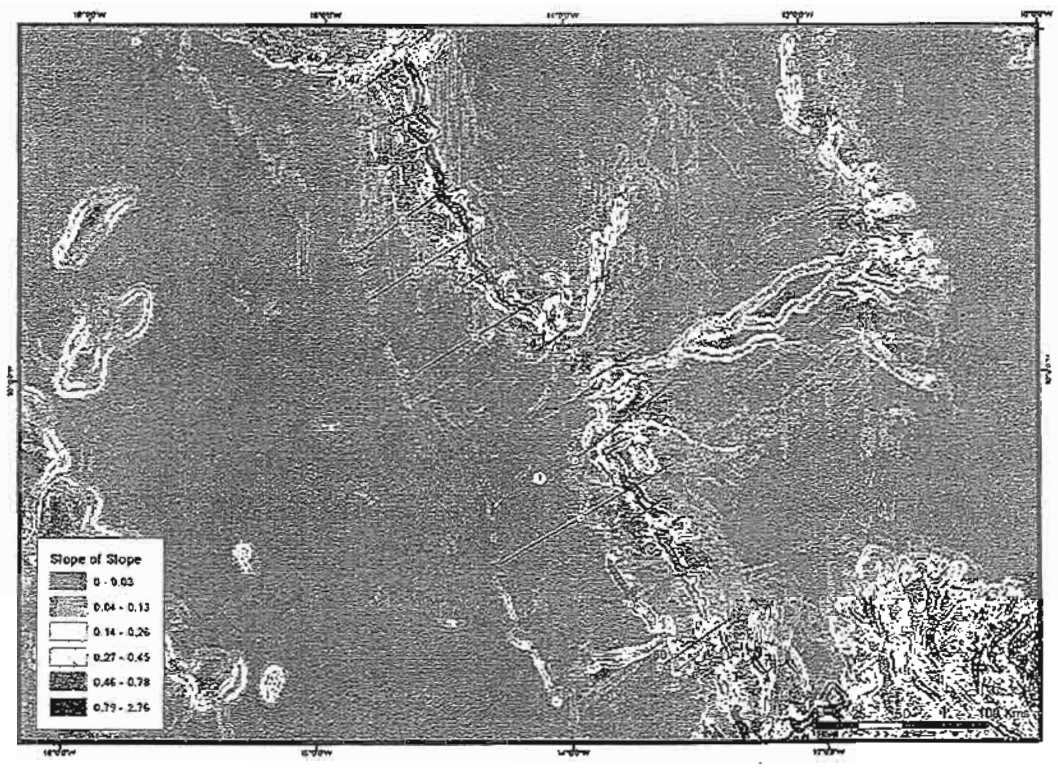


Figure 3: Map showing the slope of slope grid for the Irish partial submission area. Overlain are the foot of slope profiles with the four examined in detail in this document outlined in violet.

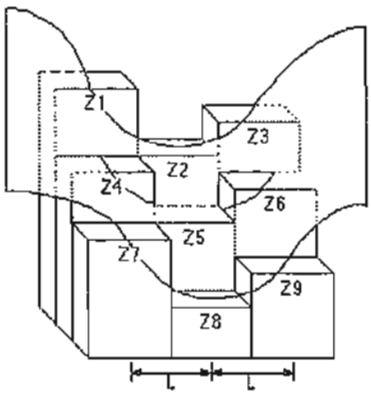
CURVATURE

The curvature of a surface, i.e. the slope of the surface at each cell, is calculated on a cell-by-cell basis. For each cell, a fourth-order polynomial (where z is the elevation and x and y are the coordinates of the geographic point) of the form

$$Z = Ax^2y^2 + Bx^2y + Cxy^2 + Dx^2 + Ey^2 + Fxy + Gx + Hy + I$$

is fit to a surface composed of a 3 x 3 window. The coefficients A, B, C, etc. are calculated from this surface.

The relationships between the coefficients and the nine values of elevation for every cell numbered as shown on the diagram are as follows:



$$A = [(Z1 + Z3 + Z7 + Z9)/4 - (Z2 + Z4 + Z6 + Z8)/2 + Z5]/L4$$
$$B = [(Z1 + Z3 - Z7 - Z9)/4 - (Z2 - Z8)/2]/L3$$
$$C = [(-Z1 + Z3 - Z7 + Z9)/4 + (Z4 - Z6)]/2]/L3$$
$$D = [(Z4 + Z6)/2 - Z5]/L2$$
$$E = [(Z2 + Z8)/2 - Z5]/L2$$
$$F = (-Z1 + Z3 + Z7 - Z9)/4L2$$
$$G = (-Z4 + Z6)/2L$$
$$H = (Z2 - Z8)/2L$$
$$I = Z5$$

The ESRI curvature function calculates the curvature of a surface at each cell centre. The output of the curvature tool is the second derivative of the input surface dataset (for example, the slope of the slope) such that

$$\text{Curvature} = -2(D + E) * 100$$

Profile curvature is the curvature of the surface in the direction of slope. The ESRI curvature function calculates profile curvature using:

$$\text{Profile Curvature} = 2*(DG^2 + EH^2 + FGH)/(G^2 + H^2)*100$$

The profile curvature function produces a grid showing the rate of change of slope for each cell. A positive curvature value indicates that the surface is upwardly convex at that cell. A negative curvature value indicates that the surface is upwardly concave at that cell. A value of zero indicates that the surface is flat. Units of the curvature/profile curvature output grids are 1/100 z units. The profile curvature for the Irish partial submission area is shown below (Fig. 4).

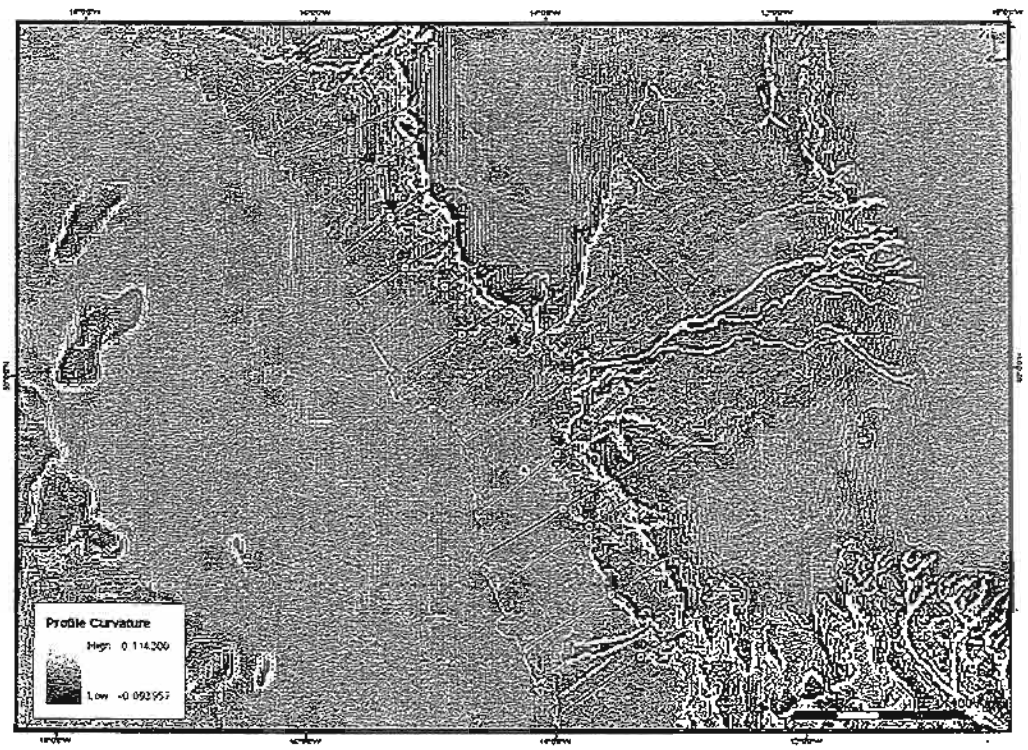


Figure 4: Map showing the profile curvature grid for the Irish partial submission area. Overlain are the foot of slope profiles with the four examined in detail in this document outlined in violet.

PROFILE ANALYSIS

The profiles drawn on the bathymetric grid in CARIS LOTS for the foot of slope analysis were recreated here on the slope of slope and profile curvature grids and examined for major similarities and differences. The graphs below show the profiles with distance along profiles across the top, depth along the left-hand axis and grid value (slope of slope or profile curvature) along the right-hand axis.

Foot of Slope 50

Slope analysis for FOS 50 reveals a two-segment slope as described above (Fig. 5). The morphology of profile FOS 50 is dealt with in some detail in document IRL-LETT-03-09_Sept_2005.

Local changes in gradient occur along the upper segment of the slope (marked a and b on the figure). These are responsible for the well-developed peaks on the slope of slope profile. Where the upper slope segment is separated from the lower slope segment, a headwall scar is developed. The feature is responsible for the third peak (marked c below) on the slope of slope graph. This feature was also selected by the CARIS LOTS FOS pick tool. Given the nature of this two-segment slope profile, these inner three FOS possibilities (a, b and c) were disregarded as local maxima. As such, the base of slope region was refined to the lower end of the lower slope. In both the slope of slope and the profile curvature graphs (Fig. 6) the foot of slope was located at the base of the lower slope. Our foot of slope selection using CARIS LOTS

was also located in this area. This interpretation is further supported by the well-developed rise that was also picked by the CARIS LOTS tool (again see document IRL-LETT-03-09_Sept_2005.

If the three landward local maxima (a, b and c) are discarded, point d is the obvious choice for the location of the foot of slope. This represents a refining of the base of slope region (defined by morphology) for the profile using a number of mathematical methods to analyse the change in gradient.

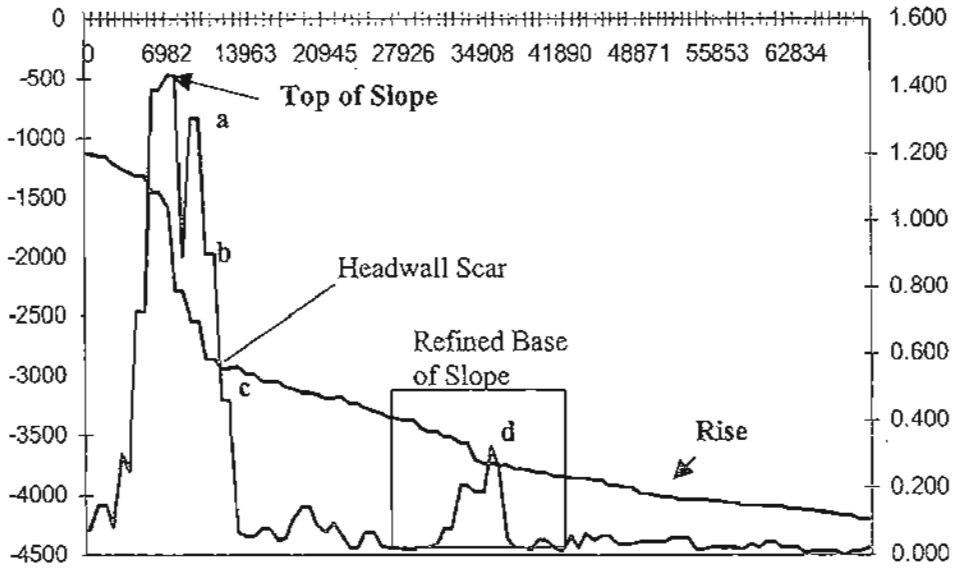


Figure 5: Slope of slope graph for FOS 50.

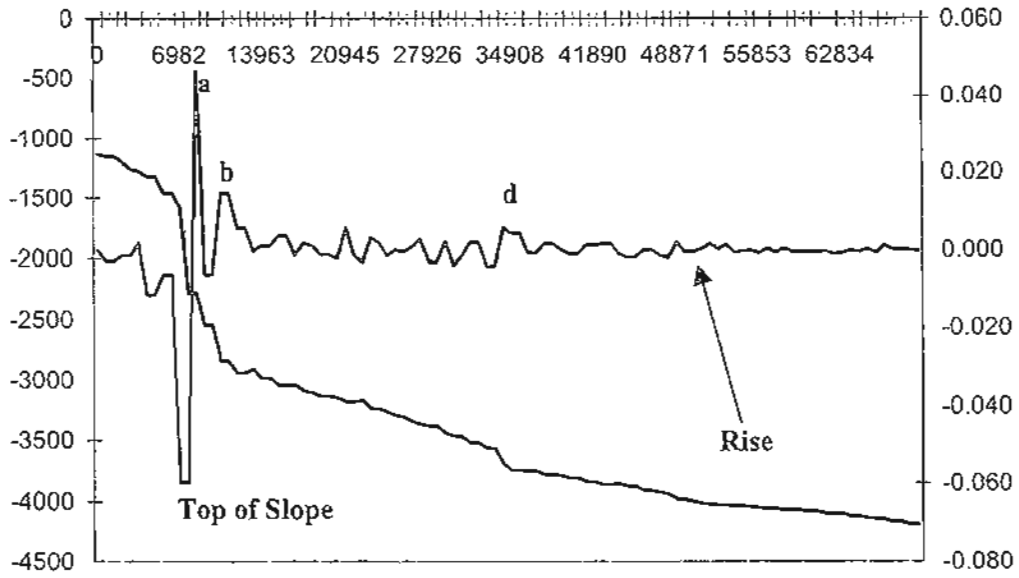


Figure 6: Profile curvature graph for FOS 50.

Foot of Slope 51

FOS profile 51 presents a difficulty in accurately establishing the foot of slope point because of the gradual nature of the slope and the unclear distinction between the slope and the rise. Nevertheless, a number of changes in gradient occur and, with careful analysis, the foot of slope point can be assessed.

The largest peak on both profiles (marked a on Fig. 7) represents a local maximum and is located more than half way up the slope. This makes it highly unlikely to be the point where the slope meets the rise. As with FOS 50, and explained in document IRL-LETT-03-09_Sept_2005, there is a well-developed headwall scar on the profile and downslope from this point the bathymetric profile surface is irregular leading to a number of local maxima that distort the true picture of the profile (marked b on Fig. 7). Also clear from the graphs is the beginning of the rise (marked on the bathymetric profile, and also picked on the CARIS LOTS method; fig 3 in document IRL-LETT-03-09_Sept_2005.

Disregarding these local maxima, the base of slope region is refined to the lower slope area (Fig. 8). On the basis of the methodology presented here the foot of slope point would be placed at point c on both the slope of slope and profile curvature graphs. The CARIS LOTS pick is closer to point d on the profile curvature graph (Fig. 8). The pick generated by CARIS LOTS (see fig 3 in document IRL-LETT-03-09_Sept_2005) is the only one generated in the vicinity of both points c and d. The difference is likely due to differences in mathematical methods as well as a slight variation in the location of the profile. At any rate, using either methodology yields approximately the same position for the foot of slope point.

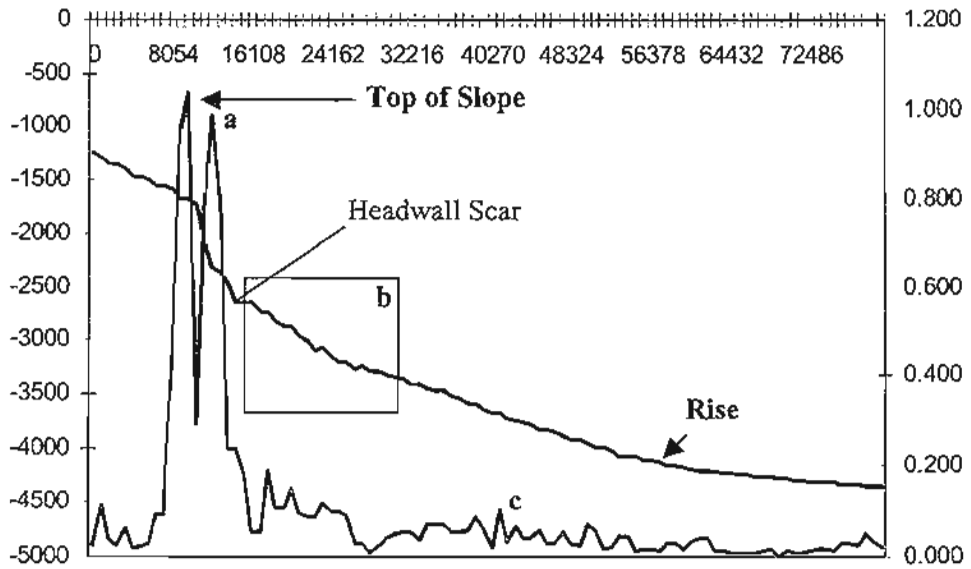


Figure 7: Slope of slope graph for FOS 51.

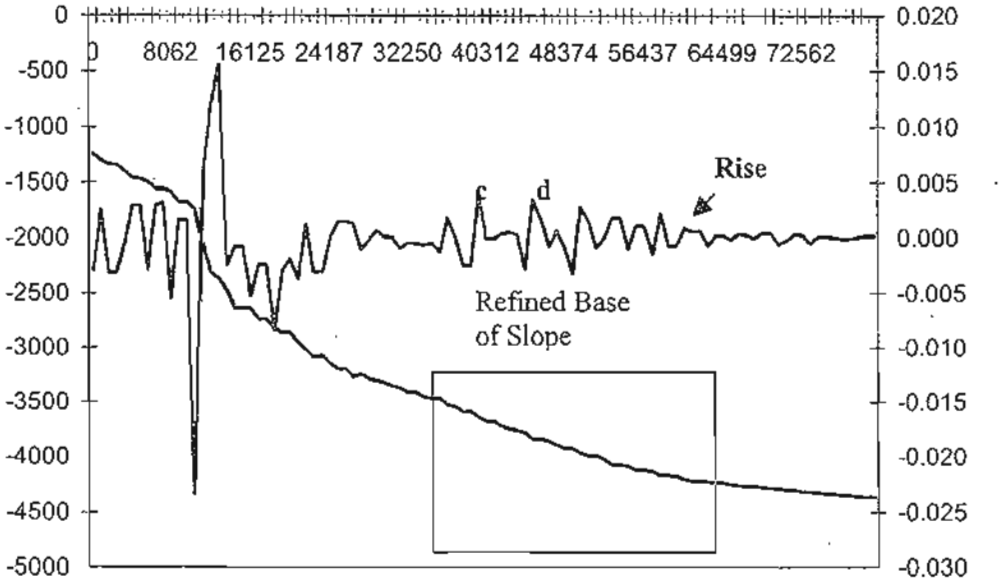


Figure 8: Profile curvature graph for FOS 51.

Foot of Slope 53

Slope analysis for FOS profile 53 reveals a number of local maxima close to the top of the slope (Figs. 9 & 10). The local maximum (marked a on Fig. 9)is clearly shown on both the slope of slope and the profile curvature profiles. From the bathymetric profile it can be seen that this is a localized feature (inflection point). It may represent a local bathymetric feature such as a scarp or ledge, or possibly noise in the data as described for FOS 50 in Part III, section 3.3.3.1, page 122, paragraph 3.

A second point is located further downslope (marked b on the profiles below). This is interpreted to be too far upslope to represent a foot of slope. FOS profile 53 can also be regarded to have a two-segment slope, and these two points (a and b) occur on the upper slope. Point c on Figure 9 represents the maximum change in gradient on the landward side of a mound feature. These local maxima are disregarded and so the base of slope region is refined to the region shown on Figure 9. The foot of slope selection from either the slope of slope graph or the profile curvature graph (marked d below), occurs in a similar position to the selection of the CARIS LOTS pick. The variation between the methods can be ascribed to differences in mathematical methodology.

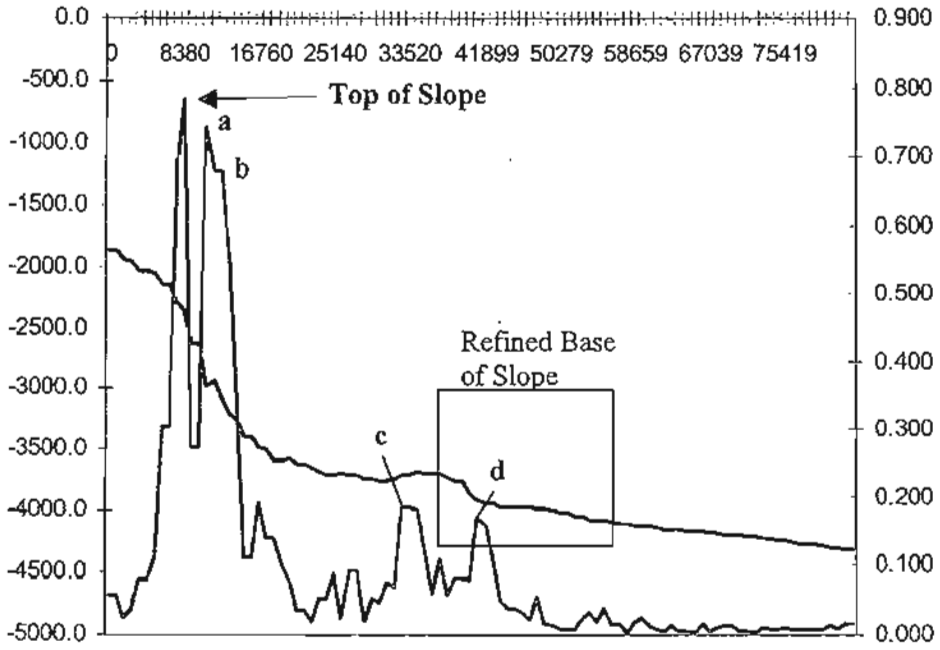


Figure 9: Slope of slope graph for FOS 53.

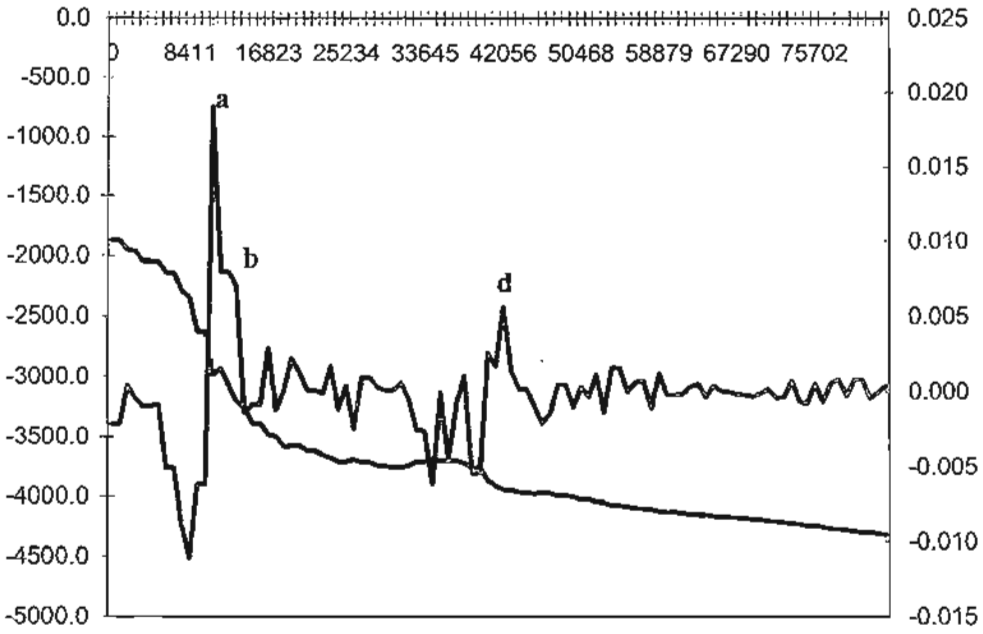


Figure 10: Profile curvature graph for FOS 53.

Foot of Slope 57

FOS profile 57 again reveals a two-segment slope, with an upper steeper slope grading into a lower gentler slope. The declivity of the lower slope is approximately 4° (see Appendix 3.8, FOS57_DP_ED), which is too steep for a continental rise in

this region. In other profiles in this region no continental rise is developed, as is particularly well illustrated on FOS 59.

Slope analysis for profile 57 reveal two local maxima that were disregarded in the course of our analysis. The first (marked a on Fig. 11) is located too far upslope to be considered the foot of slope. The second (marked b on both graphs) is clearly a localized dip in the bathymetric profile. On the profile curvature in particular a number of other peaks are a result of undulations in the lower slope (Fig. 12).

Once these two local maxima are disregarded the foot of slope point can be clearly identified at the base of the lower slope, particularly on the slope of slope profile (Fig. 11), in the same position as the FOS selected using the CARIS LOTS tool.

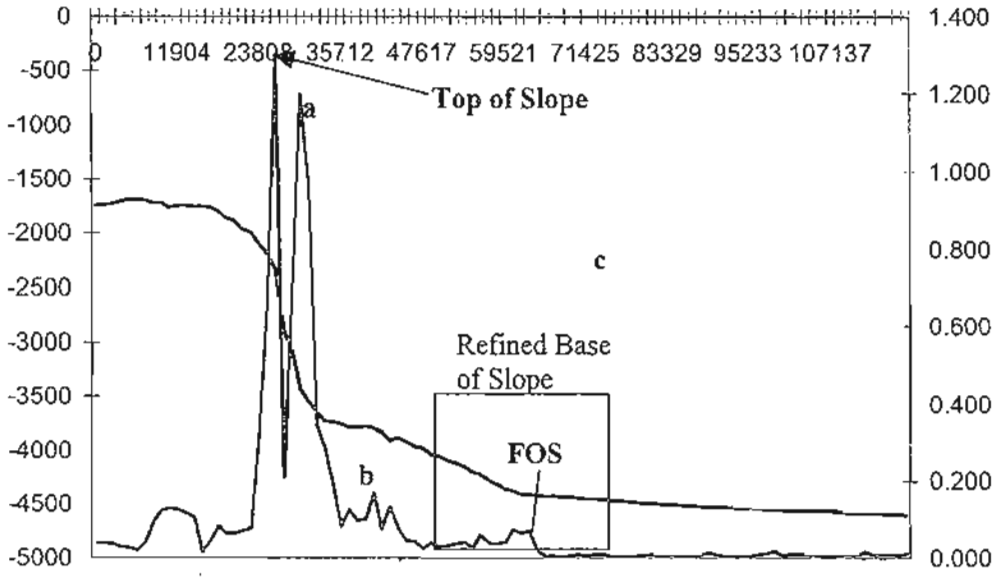


Figure 11: Slope of slope graph for FOS 57.

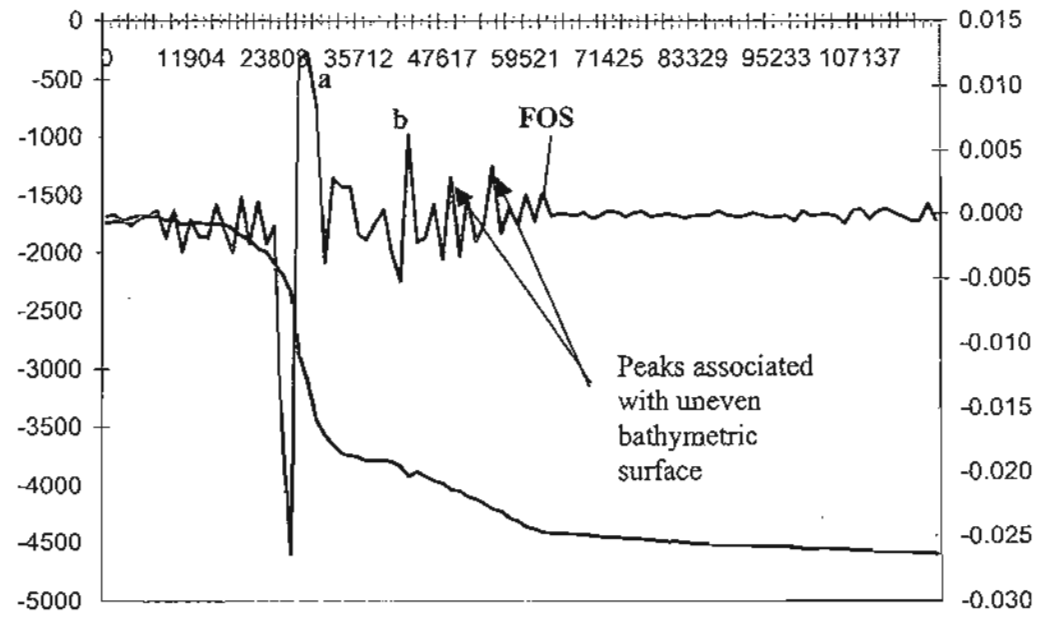


Figure 12: Profile curvature graph for FOS 57.

CONCLUSION

While it is clear there are differences between the various methodologies, it can be shown that with careful analysis of the profiles, the results are quite consistent once certain possibilities are excluded. The exclusion of these alternate FOS points, done purely on the basis of morphology, does not represent evidence to the contrary but can be considered as a refinement of the base of slope area that was defined morphologically at an earlier stage.

REFERENCES

Antunes, N. M. and Pimentel, F. M., 2003, Reflecting on the Legal-Technical Interface of Article 76 of the LOSC: Tentative Thoughts on Practical Implementation. ABLOS Conference - Addressing Difficult Issues in UNCLOS, 28-30 October 2003, International Hydrographic Bureau, Monaco, 37pp.

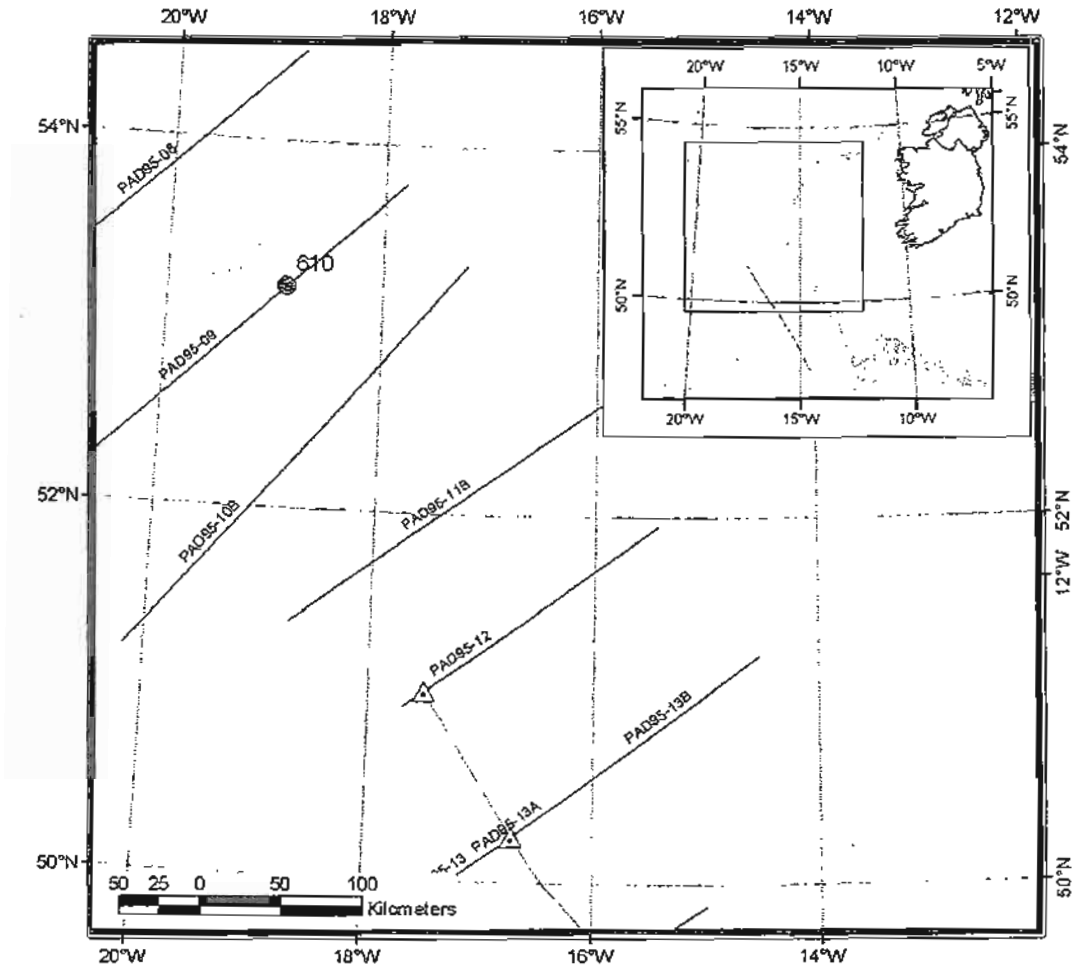
Clarification regarding Q.10, Q.14 and Q.15

Q.10b

Ireland regrets to inform the Subcommission that we are unable to accommodate the request for the actual velocity analysis/velocity picks used from the processing job. It appears that we did not receive this data at the time the deliverables were transmitted to the Petroleum Affairs Division by the contractors (1995). Given the time that has passed we do not believe that this data would still be available. We hope that clarifications already provided in respect of the error analysis for the seismic data used in establishing the 1% sediment thickness points will suffice for the further consideration of the Subcommission (see documents IRL-DOC-07-09_Sept_2005 and IRL-DOC-08-17_Oct_2005).

Q.10c cont....
In order to address the range of error in the velocity analyses two approaches were taken:

1) The velocity data for PAD95-09, which was shot in the same survey as the PAD95-12 and 13 lines used to determine 1% sediment thickness, and the DSDP Site 610. This analysis is outlined in document IRL-DOC-07-09_Sept_2005. A map showing the location of the relevant seismic profile along with the DSDP site is provided here for clarity.



Map showing the location of seismic line PAD95-09 that is coincident with DSDP Site 610 (Red circle). 1% sediment thickness points are also shown (yellow triangles) along with the submitted outer limit (green line). Inset map shows entire submitted outer limit (green line).

2) A second method to determine error was to statistically calculate the error range in the data chosen to establish the fixed points at each of which the thickness of the sedimentary rocks is at least 1% of the shortest distance from such point to the foot of the continental slope. As suggested in the CLCS Guidelines (8.3.11), the standard deviation for the interval velocities used in the calculation of the 1% fixed points (shown in Table 1) show that the error range is approximately 10% in both cases. The error is the standard deviation of the four closest CDPs to the 1% sediment thickness point, expressed as a percentage of the mean of the four CDPs. This error estimate is in line with that recognised in the CLCS Guidelines (8.3.2), and the lower, and more conservative, −10% estimate of error was chosen by Ireland for it's selection of the fixed points at each of which the thickness of the sedimentary rocks is at least 1% of the shortest distance from such point to the foot of the continental slope.

		PAD95-12			PAD95-13	
	CDP	SPN	VINT	CDP	SPN	VINT
	14090	4746	2868.397	4650	11597	3408.889
	14250	4798	3060.606	4810	11650	3141.566
	14410	4852	2396.624	4970	11704	2866.834
	14570	4905	2826.709	5130	11758	2773.092
ST DEV			280.1494			287.1643
MEAN			2788.084			3047.595
ERROR (%)			10.0481			9.422652

No sills were interpreted based on seismic data in the area so while it is possible that the variation in velocities is a function of the presence or absence of igneous sills within the sedimentary sequence, it is more likely to be the result of variations in velocity picking by the seismic data processor during processing.

Q.14

Ireland is happy to supply the Subcommission with copies of the seismic lines WI-9, 11, 13 and 15 along the western edge of the Porcupine Bank. Unfortunately the Petroleum Affairs Division only has these lines in paper format. Electronic scanned copies of certain WI lines such as WI-23 are contained in the Submission, however electronic copies are not currently available for the four lines requested. We hope that the paper copies will suffice for the Subcommission to gain a better understanding of the lower slope/rise zone along the Porcupine Bank.

Q.15 Clarification regarding the discrepancy in Paragraph 3 of Page 5 of document IRL-LETT-02-08_Sept_2005. This should have read:

"The co-ordinates prescribed in the Order are accurate to one tenth of a minute, i.e. the diameter of a circle describing each is approximately 185m. This in turn means that each set of co-ordinates essentially describes a circular area of 26,938 m². Modern survey technologies have a much greater precision than the charts used for the definition of the base points in 1959. However for the purposes of the present Submission, and in particular the measurement of 200 and 350 nautical mile limits drawn from baselines, the selection of one datum over another for conversion of the 1959 base point values for GIS calculations is largely academic as the divergence between values for different datums will fall within the margin of imprecision (± 93m, i.e. the radius of the circle) of the original base point values."

16 Character of the continental slope

16.1

A two-segment structure is apparent along the bulk of the area included in the Irish partial submission. North of the partial submission area, one crosses a fundamental crustal boundary – the Charlie Gibbs Fracture Zone (CGFZ) – and the margin changes from a non-volcanic rifted margin to a volcanic rifted margin. To the south of the partial submission area (Zone C) there is evidence for a continuation of the two-segment structure.

16.2

The boundary between the two segments of the continental slope for the Irish continental margin has been identified primarily on the basis of morphology. As can be seen on the profiles below (Figs. 1a-d) the gradients of the upper slope region are 10 - 20°, the gradient of the lower slope is approximately 2°. The boundary between the upper slope segment and the lower slope segment, by definition, must be actually within the slope as opposed to at the foot of the slope.

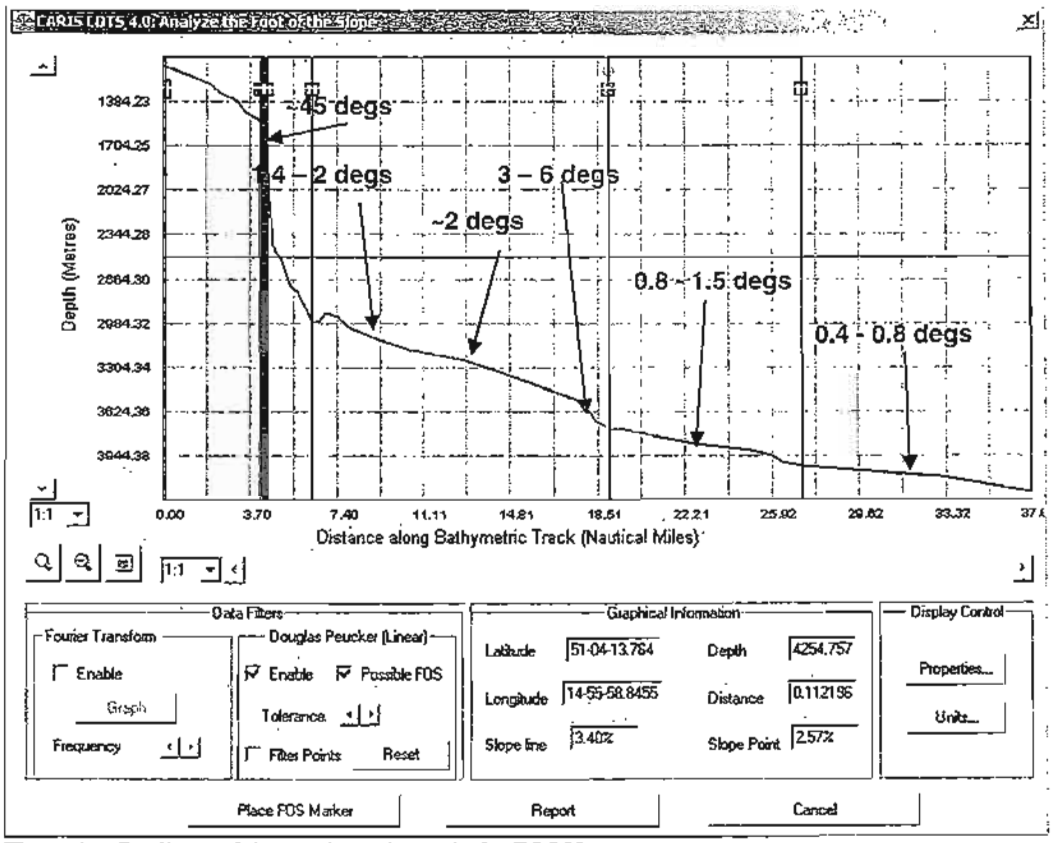


Figure 1a: Gradients of the continental margin for FOS50.

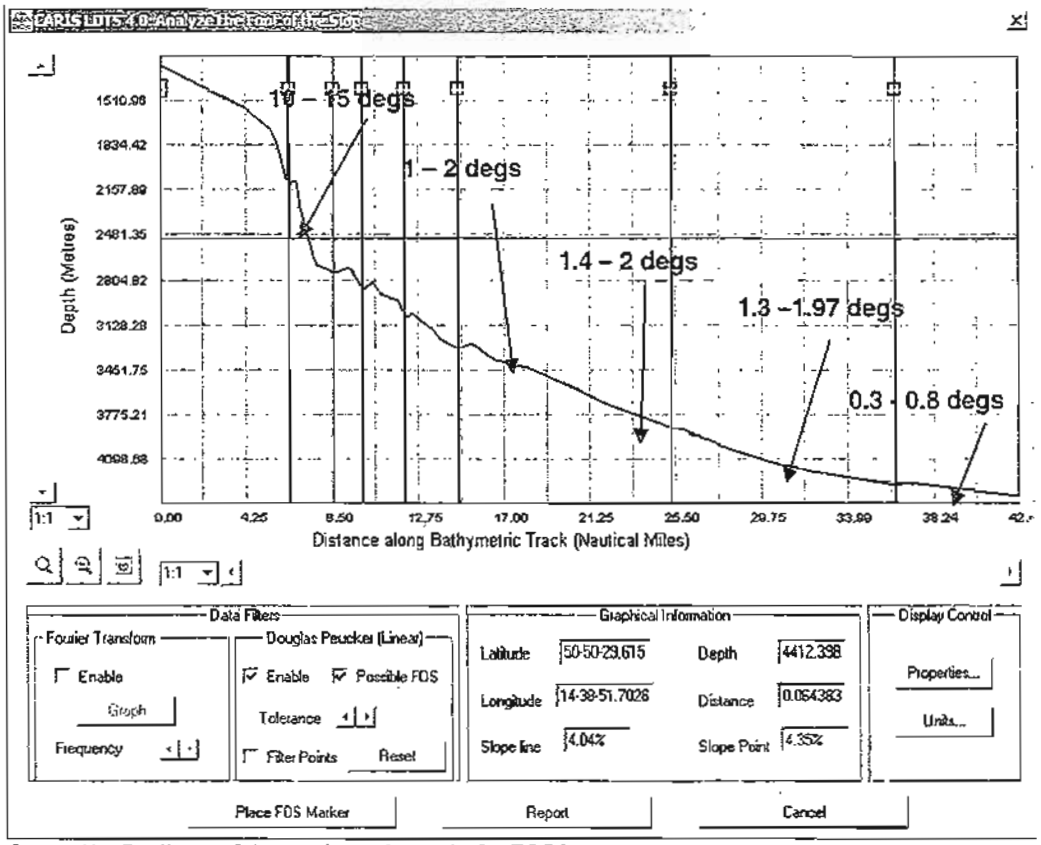


Figure 1b: Gradients of the continental margin for FOS51.

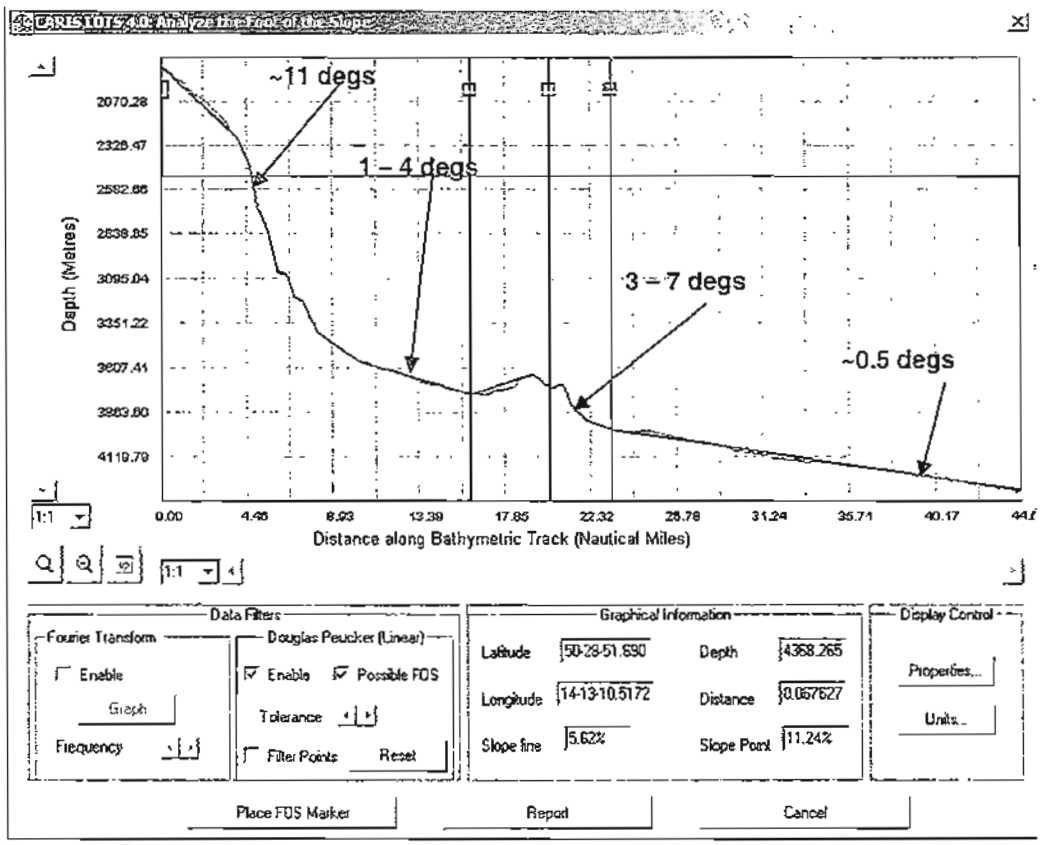


Figure 1c: Gradients of the continental margin for FOS53.

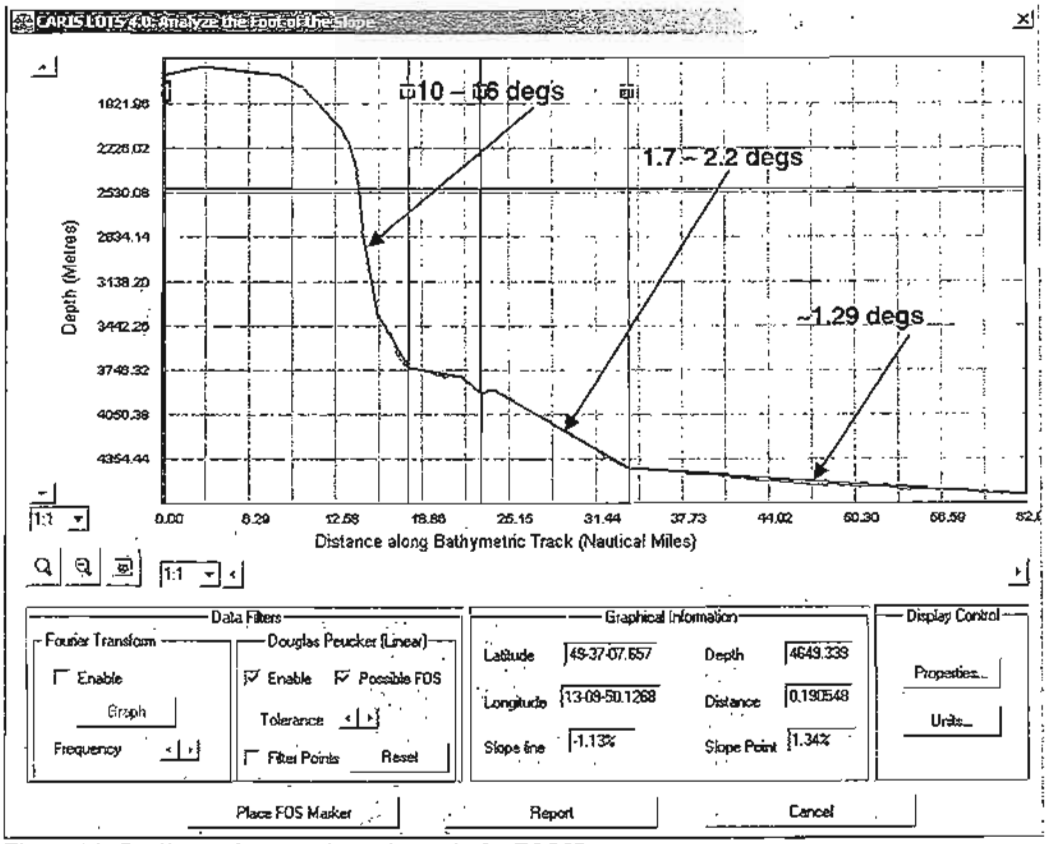


Figure 1d: Gradients of the continental margin for FOS57.

16.3

The full extent of the rise can be determined by examining extended bathymetric profiles along the four key FOS profiles (Figs. 2a-d) The northern three extended profiles (FOS50, 51 and 53) show a large, well-developed and distinct rise stretching from the base of the lower slope to the near horizontal Porcupine Abyssal Plain. The approximate extent of each rise is also marked on each extended profile. The seaward edge of the rise can be identified on the extended profiles where the gentle gradient of the rise meets the deep ocean floor. These are marked on the figures 2a-d below by a vertical arrow. Extended profile 57 shows a gently sloping seafloor, which may or may not be a rise as the Porcupine Abyssal Plain does not appear as distinct here.

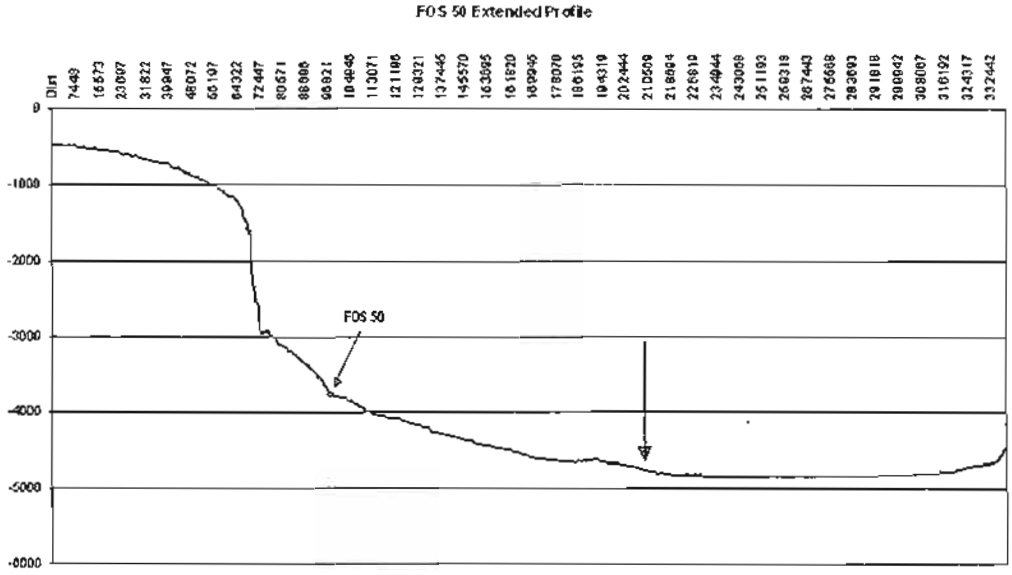


Figure 2a: Extended profile for FOS 50

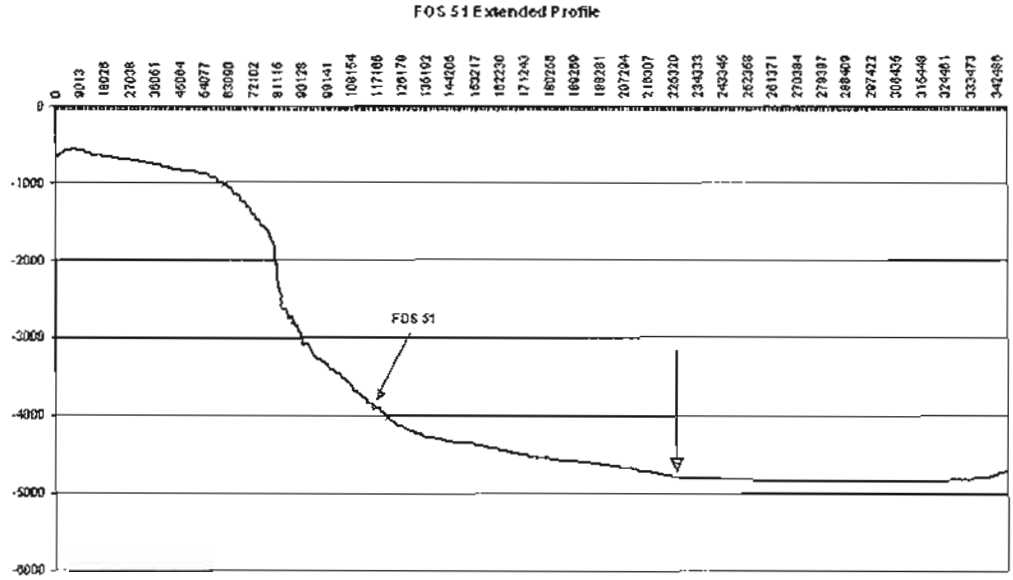


Figure 2b: Extended profile for FOS 51

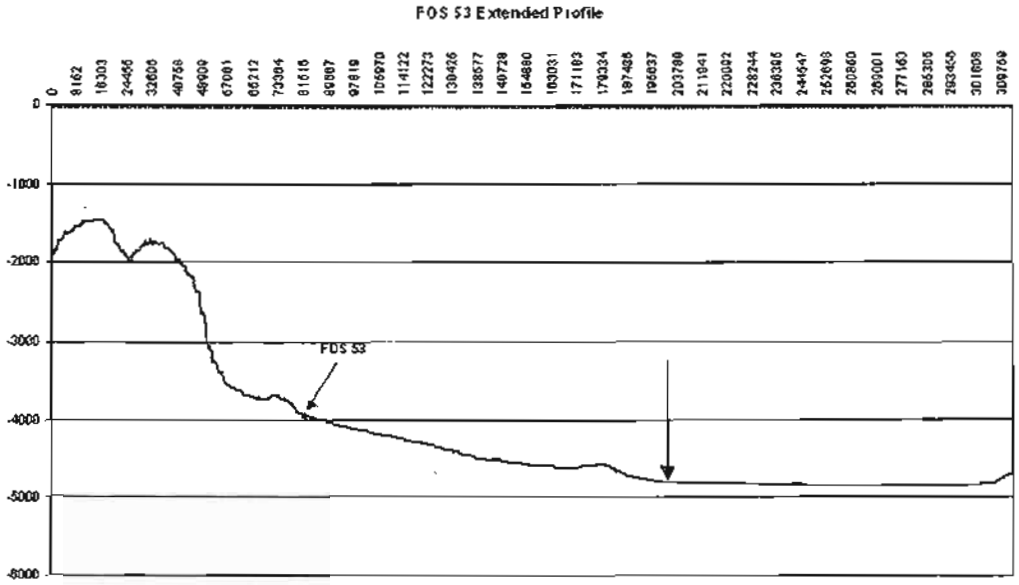


Figure 2c: Extended profile for FOS 53

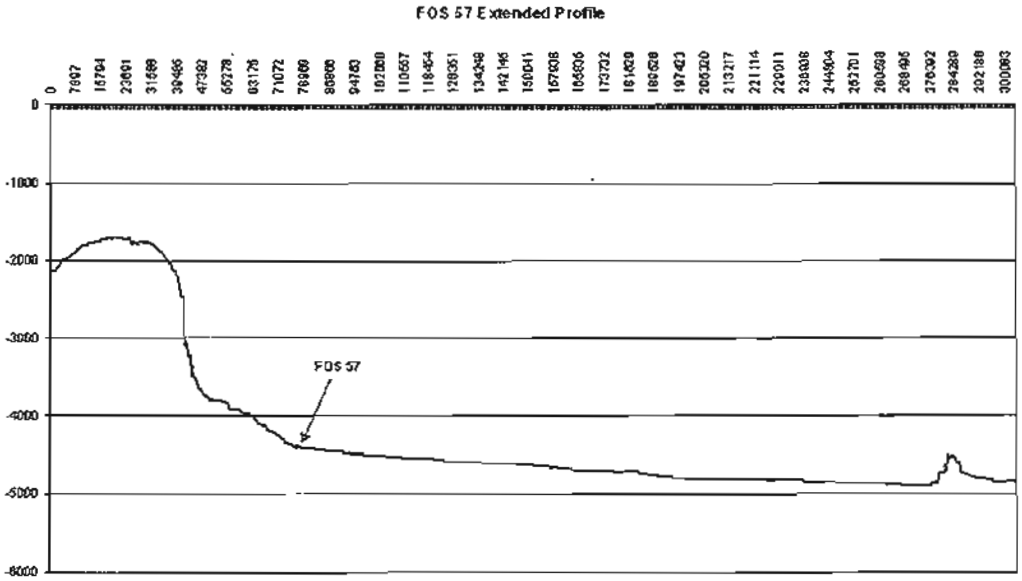


Figure 2d: Extended profile for FOS 57

Further morphological evidence for the location of the rise is provided by examining the gradients of the sea floor seaward of the Foot of Slope points. For the northern three profiles (FOS50, 51 and 53), this gradient is 0.3 – 0.8°. These lower gradients distinguish the rise from the lower slope, which has a gradient of approximately 2°. For profile FOS57, the deep ocean floor appears to have a gradient of approximately 1.2° (Fig. 1d) that extends seaward to a seamount feature in the Porcupine Abyssal Plain (Fig. 2d).

16.4

Ireland would like to reiterate that the only criteria being used to differentiate the lower slope from the rise is morphological. For this the maximum change in gradient at the base of the lower slope was used.

Supporting geological and geophysical data are used solely to aid in identifying the base of slope region, and in particular to identify features one would not find developed in the rise. An example of this may be seen in seismic line PAD95-13. Ireland has interpreted this seismic section (see IRL-Lett-03-09_Sept_2005 and IRL-Presentation-04-23_Jan_2006) to aid in identifying the continent – ocean transition. This aids in refining the base of slope to exclude the gradient change between the upper and lower slope. On the basis of this refined base of slope using the maximum change in gradient allows us to identify the foot of slope between the rise and lower slope.

16.5

Extended profile FOS 53 (Fig. 2c) shows that a rise is developed out to the Porcupine Abyssal Plain. The seaward edge of the rise ends at a significant mound feature immediately before the Porcupine Abyssal Plain. There is no seismic data through FOS 53, although CM-06 is the closest seismic line and displays some similar features.

16.6

Figure 1 of Document 8 (IRL-DOC-08-17_Oct_2005) illustrates the base of slope regions where multiple possibilities exist. The type 2 example, as seen in the Rockall Trough, shows two geographically disparate regions that may be the base of the continental slope. Geology and geophysics was used to correctly identify the base of slope region. This is similarly the case for the type 3 and 4 margins (i.e. the Gollum Channel Region and the Western Edge of the Goban Spur respectively).

16.6.i

The base of slope region for the type 1 margin is located in a single geographic region. The detailed analysis of this region led to the identification of the two-segment slope and a refinement of the initial base of slope definition accordingly, as outlined in Document 8.

16.6.ii

We are of the view that both mass-movement material deposited downslope and drift material accreted to the lower part of the slope constitute part of the slope proper, and not the rise. Evidence for these mass-movement deposits have been outlined in Letter

3 (IRL-Lett-03-09_Sept_2005) and in our presentation of January 23rd 2006 (IRL-Presentation-04-23_Jan_2006).

16.6.iii

The apparent inconsistency between FOS 51 and FOS 48, 49 and 50 along the Porcupine Bank arises due to the gradational nature of the transition from the lower slope to the upper rise. Lack of seismic data along the profile makes it difficult to provide a geological reason for this, however significant sediment build-up along the slope in this area may obscure the well-marked two-segment slope seen in the other profiles. FOS51's proximity to the Gollum Channel, a significant source of sediment, further supports this conclusion. The profile for FOS51 is located within the high resolution PAD bathymetric data acquired in 1996 (see Section 2.2.1 of Part III of Ireland's submission). Geomorphometric analysis of this profile confirms that the maximum change in gradient within the lower slope occurs in the region currently proposed (see IRL-DOC-08-17_Oct_2005).

Examining the extended profile (Fig. 2b) (using GEBCO data as background), it is possible the FOS would be located further downslope from the current FOS selection. However, given the coverage of the high resolution data and the results of three separate mathematical determinations of the maximum change in gradient at the base of the lower slope on that data (all of which yield similar results), FOS51 represents the best selection for the foot of the continental slope.

16.7

Ireland would like to clarify that the declivity of the lower slope should read 4% and not 4° as stated in IRL-DOC-08-17_Oct_2005. Slopes for this region of FOS57 are 1.7 - 2.2°, which are still within the generally accepted gradients of the continental slope (e.g. Eldholm and Tsikalas, 2003). We are pleased to be able to provide updated CARIS LOTS profiles (BMP files), edited and unedited text files for each of the four key FOS points (FOS50, 51, 53 and 57) citing the gradients in degrees rather than percent to aid the Subcommission in their examination of the profiles.

References

Eldholm, O. and Tsikalas, F., 2003, Scientific Aspects of the continental shelf in Nordquist M. H., Moore, J. N., and Heider, T.H. (eds), Legal and Scientific Aspects of Continental Shelf Limits, Martinus Nijoff Publishers, Leiden, pages 41 – 57.

Geological and Geophysical Evidence for the Location of the Foot of the Continental Slope along the Irish Non-volcanic Passive Margin

Introduction

The foot of slope positions along the Irish continental margin were initially determined in the Irish submission to the CLCS using the maximum change in gradient at the base of the continental slope, as provided for under Article 76(4)(b). Subsequent interactions with the Subcommission established to examine the Submission of Ireland to the CLCS revealed that the selected foot of slope points were not the maximum changes in gradient within the previously defined base of slope region. Ireland, then presented evidence, both geological and morphological, outlining the justification of its foot of slope determination within the context of a two-segment continental slope and the consequent refinement of the base of slope region to exclude the local maximum between the upper and lower slope segments.

In its letter dated 27th January 2006, the Subcommission outlined that, in their view, the process of such refinement of the base of slope is not specifically provided for under the CLCS Guidelines. Furthermore, the adoption of purely morphological techniques to determine the maximum changes in gradient at the base of the slope would produce an outcome in which the foot of the continental slope would be located more landward. It was recommended that the foot of the continental slope be determined using 76(4)(b) with "considerations to be given with respect to evidence to the contrary"

It is Ireland's belief that the morphological features along which the foot of slope points are located are inherently part of the continental slope and that underlying (continental) crustal processes have contributed to this two-segment slope morphology. Therefore Ireland acknowledges the advice provided by the Subcommission with respect to the use of evidence to the contrary to identify the foot of the continental slope and presents the foot of slope points in this context. This study outlines the examination of available data to provide a geological overview of the Irish continental margin, and specifically the nature of the crust beneath the lower slope segment. The foot of slope points are now presented as occurring as changes in gradient that are not the maximum within the base of slope, and are therefore justified using the evidence outlined below

Background and Regional Context

The Irish non-volcanic passive margin abutting the Porcupine Abyssal Plain, which makes up the current submission, runs from the Charlie-Gibbs Fracture Zone in the north to the Goban Spur in the south (Fig. 2.2, Part II Irish Submission, pg. 7). Morphologically, it is dominated by the Porcupine Bank, which has water depths of 200 – 300m, the Porcupine Seabight, which has water depths of 3000m, and the Goban Spur, which has water depths ranging from

1000 – 3500m. Despite this variable morphology, the ocean-continent boundary along the margin is surprisingly straight.

Rifting and initiation of seafloor spreading in this part of the North Atlantic began in mid-Aptian to late Albian, as determined by earliest sediments recovered from DSDP Leg 80 Site 550 (de Graciansky et al, 1985). The C34 anomaly (123 ± 5 Ma) is located approximately 50km from the continental margin in the northern part of the area and up to 120km from the continental margin in the southern part of the area. The conjugate margin for the Porcupine-Goban Spur region occurs at the Flemish Cap-Orphan Knoll on the Newfoundland continental margin (Fig. 1).

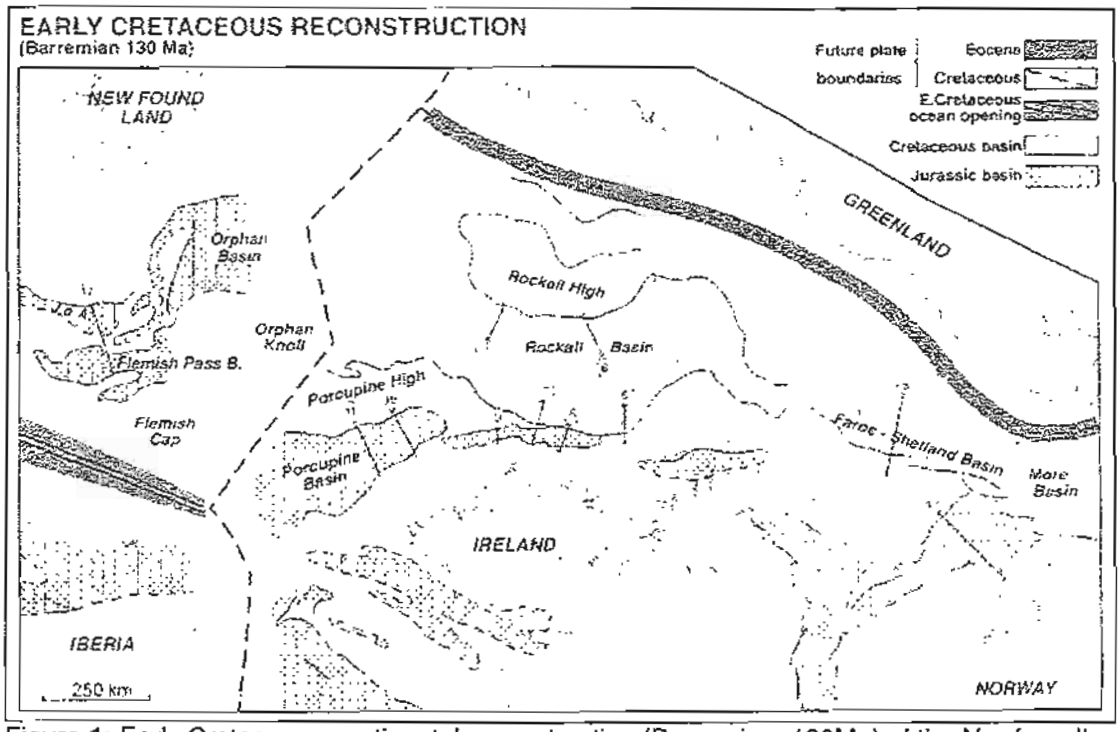


Figure 1: Early Cretaceous continental reconstruction (Barremian, 130Ma) of the Newfoundland to Ireland area. From Spencer and MacTiernan (2001).

Potential Field Considerations

The total magnetic intensity grid (Fig. 3.25, Part III Irish Submission, pg. 63) shows the difference between the high amplitude – short wavelength in the oceanic domain and relatively low amplitude - long wavelength in the continental domain. This simple picture is somewhat complicated by a number of factors:
1) The Porcupine Bank is highly magnetised, although it does have long wavelengths (this is consistent with much of the Caledonian crust),
2) There is an igneous body along the western edge of the Goban Spur that is also highly magnetised. This body was intersected by DSDP 551 and is interpreted to be synrift volcanics (de Graciansky et al, 1985).
3) There is a wide 45 – 120km zone of weakly normally magnetised crust between the C34 Anomaly and the continental margin.

The normally magnetised crust that occurs between the C34 anomaly and the continental margin shows weak striping (Fig. 2), which in the southern region may be associated with seafloor spreading or may be simply related to the effect of basement topography (de Graciansky et al., 1985). The narrowing of the weakly normal magnetised crust northwards confirms northward-directed opening of the North Atlantic in this region. Recent evidence suggests that the crust between the C34 Anomaly and the Goban Spur region may be exhumed serpentinised mantle (Bullock and Minshull, 2005).

The large positive magnetic anomaly on the western edge of the Goban Spur, interpreted to be an igneous body (dyke-sill complex?) appears to be independent of crustal type in that it occurs in both the oceanic and continental domain. This suggests that emplacement of this pre to syn-rift igneous body possibly predated the onset of seafloor spreading. One possible mechanism of achieving this would be development of exhumed serpentinised mantle possibly beneath thinned continental crust. This would place the OCT seaward of its currently recognised position.

On a free air gravity grid, the outer edge of the continental margin is marked by a gravity low or negative gravity anomaly (Fig. 3.23, Part III Irish Submission, pg. 61). This low occurs along the length of the continental margin, although, again, is complicated by the igneous body located on the western edge of the Goban Spur. The OCT roughly coincides with the westward edge of the gravity low.

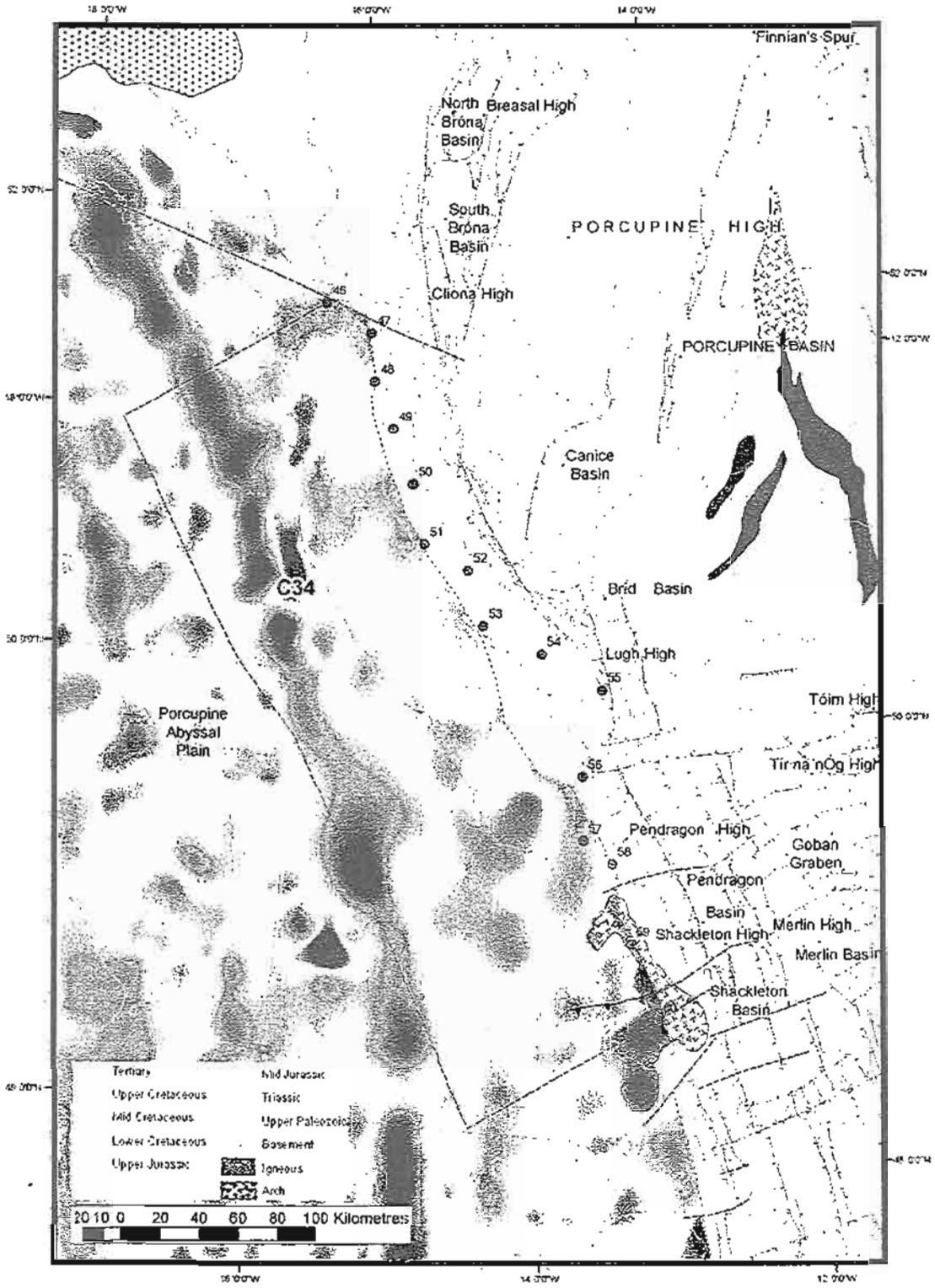


Figure 2: Geology of the Irish non-volcanic passive margin. Oceanic crust shown as magnetic anomaly grid with C34 anomaly labelled.

Seismic Considerations

In order to establish the structure of the Irish passive margin, available seismic data was interpreted. The location of the available seismic lines and the foot of slope points are shown in Figure 3.

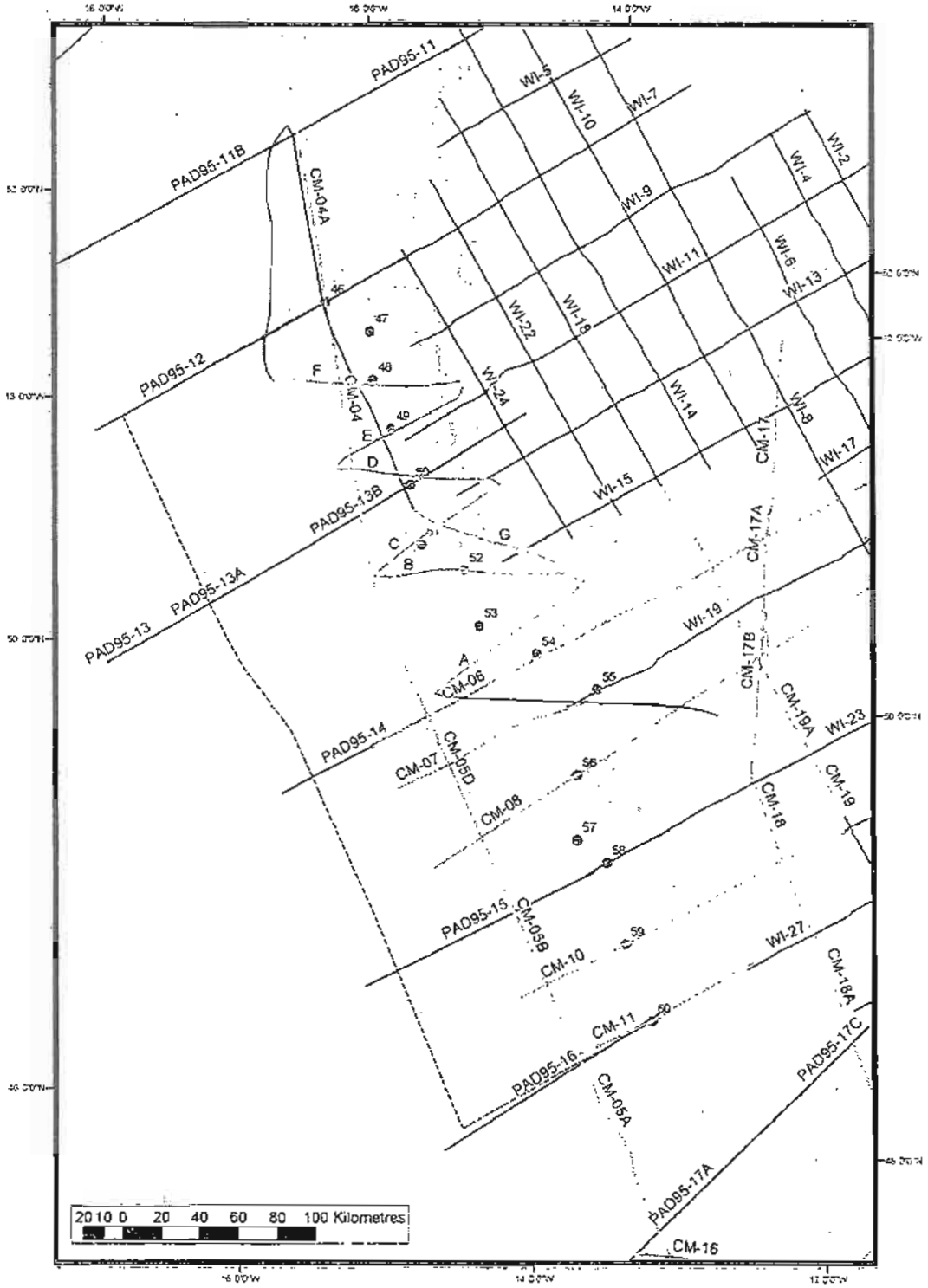
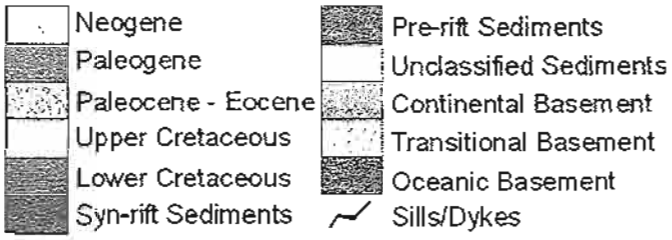


Figure 3: Seismic data used in this study. Also shown are the foot of slope positions.

In addition to the seismic data contained in the Submission of Ireland (Part III, Section 2.2.2), older archive data, which occurs along the Porcupine margin, was sourced. This data, shot by the R/V Shackleton, exists only in paper copy and was scanned to Tiff image format and is included with this document. The Shackleton profiles used in this study are highlighted in yellow and are labelled A to G in Figure 3.

For all seismic profiles interpreted in this document, the legend shown below has been used:



The Shackleton seismic lines were shot by the University of Edinburgh in 1979. These single-channel seismic profiles were shot as one single continuous line 'zig-zagging' along the Porcupine continental margin. In spite of their relatively poor quality, they provide a good insight into the nature of the continental margin, and confirm that the entire Irish passive non-volcanic margin has the down-faulted lower crustal block.

The western margin in the Goban Spur region is characterised by the Pendragon Escarpment. Below this escarpment is a well-developed terrace, which, in turn, drops off to the deep ocean floor. Interpreted seismic profile CM-10 reveals the faulted structure of the continental margin. The lower terrace represents a coherent down-faulted crustal block. The seaward edge of this block is composed of a large igneous body already mentioned above. The exact geometry of the igneous body is unknown. Although from the interpreted seismic profile and gravity and magnetic modelling (de Graciansky et al., 1985; Louvel et al., 1997), it is believed to make up a sizeable portion of this crustal block. The exact nature of the crust beyond the Pendragon Terrace is still a matter of debate. From the seismic profile, a significant difference in basement smoothness occurs between known unambiguous oceanic crust and the intermediate crust further eastwards (Fig. 4). This has been interpreted as serpentinised exhumed mantle by Bullock and Minshull (2005). This seismic characteristic between oceanic crust and intermediate crusts is also possibly present on PAD95-15. Potentially the ocean – continent transition (OCT) for this region can be very wide, depending on the nature and composition of the exhumed mantle. For the purposes of delineating the continental shelf, however, we have chosen the more conservative approach, with the OCT beginning within the Pendragon Terrace lower crustal block and ending where the oceanic basement surface becomes relatively rougher.

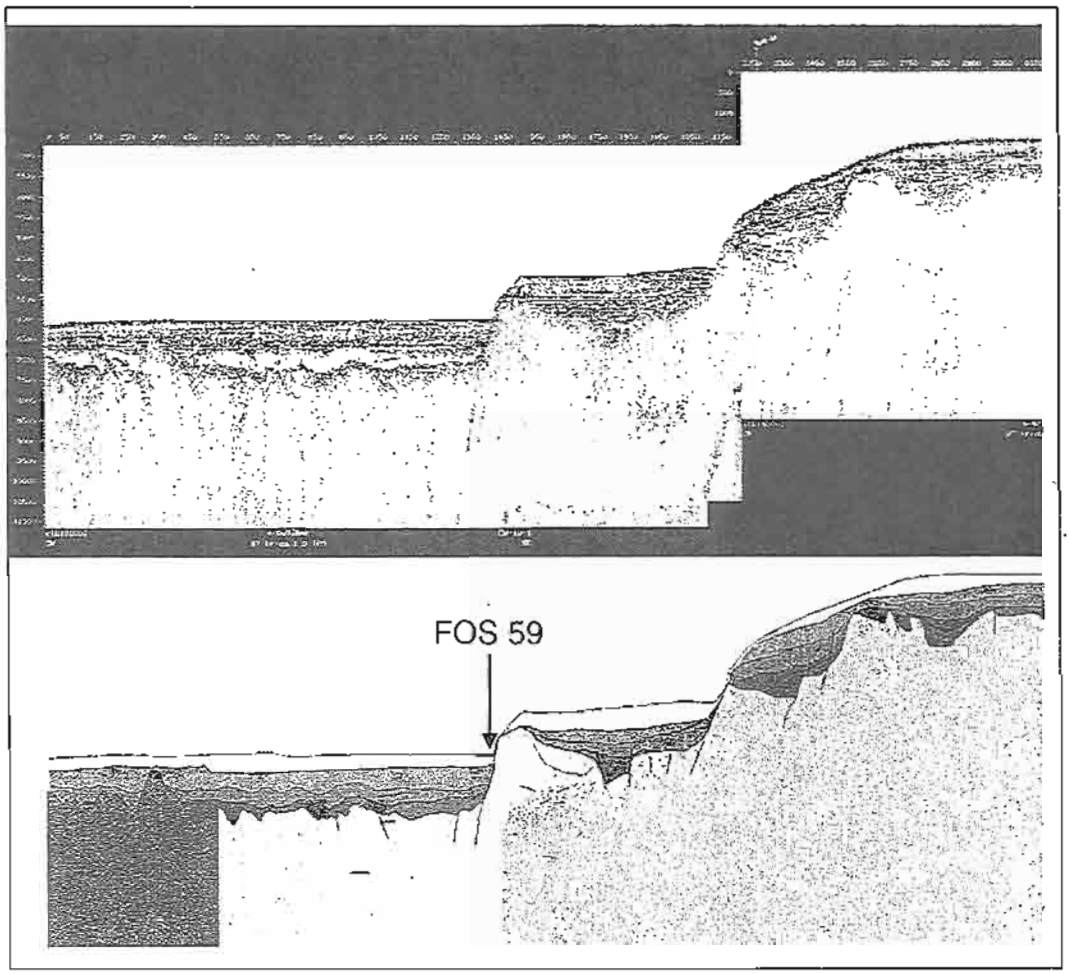


Figure 4: Interpreted seismic line CM-10. White crosses indicate igneous body. Position of FOS indicated with arrow.

Pendragon Terrace is bounded to the north and south by faults that run roughly ENE – WSW. North of the Pendragon Terrace, the lower crustal block that makes up the Pendragon Terrace occurs at a structurally lower level and is partially buried by sediment in the lower continental slope region. This area is seen in seismic profile WI-23 (Fig. 5). WI-23 shows the down-faulted region, as two well-developed crustal blocks, which have possibly been extensively intruded, or extruded upon, syn-rift. This igneous body is interpreted to be the same as that found on the Pendragon Terrace and intersected by DSDP 551. This is further backed up by the magnetic anomaly that covers this region. In terms of distance from the morphological continental shelf, the down-faulted crustal blocks extend roughly the same distance as the Pendragon Terrace, adding to the interpretation that they are inherently the same feature. Overlying the crustal blocks is a relatively thick sequence of sediments with evidence of slope failure above the blocks. This indicates that the underlying continental basement has a significant influence on the morphology and sedimentary composition of the overlying lower slope region. The OCT for this profile begins within the down-faulted block and continues seaward for 60km. Seismic profile

PAD95-15, as mentioned previously, illustrates the intermediate basement seen on the WAM profile. The seaward edge of the OCT is located on PAD95-15 where the basement surface becomes relatively rougher.

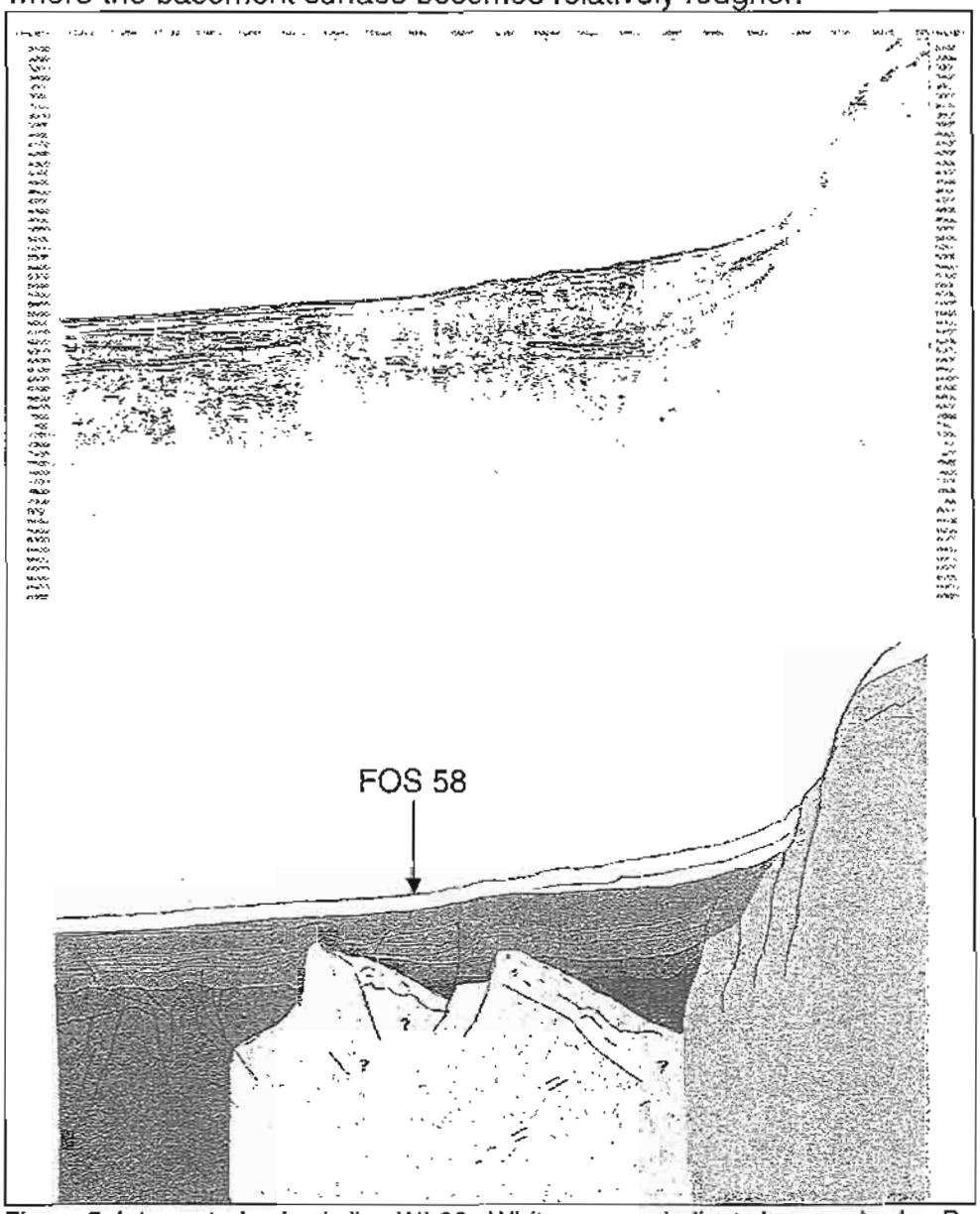


Figure 5: Interpreted seismic line WI-23. White crosses indicate igneous body. Position of FOS indicated with arrow.

North of the Goban Spur, at the mouth of the Porcupine Seabight, there is no significant morphological continental shelf developed. However, there is a structural continuity with the Lugh High crossing the mouth of the Porcupine Seabight, in effect linking the Porcupine Bank to the Goban Spur. The interpreted (outer portion) seismic section CM-06 shows the OCT in this region (Fig. 6). On the seaward side of the Lugh High, there appears to be a number of down-faulted blocks. The OCT for this region has a landward extent on the seaward side of the Lugh High and a seaward extent where the basement character becomes rougher and more irregular. Seismic profile CM-06 shows

very clearly outer down-faulted half grabens with pre to syn-rift sediments infilling the tilted surface. The oceanic basement beyond this shows typical seismic hyperbolae thereby adding another constraint to the location of the outer edge of the OCT in this region.

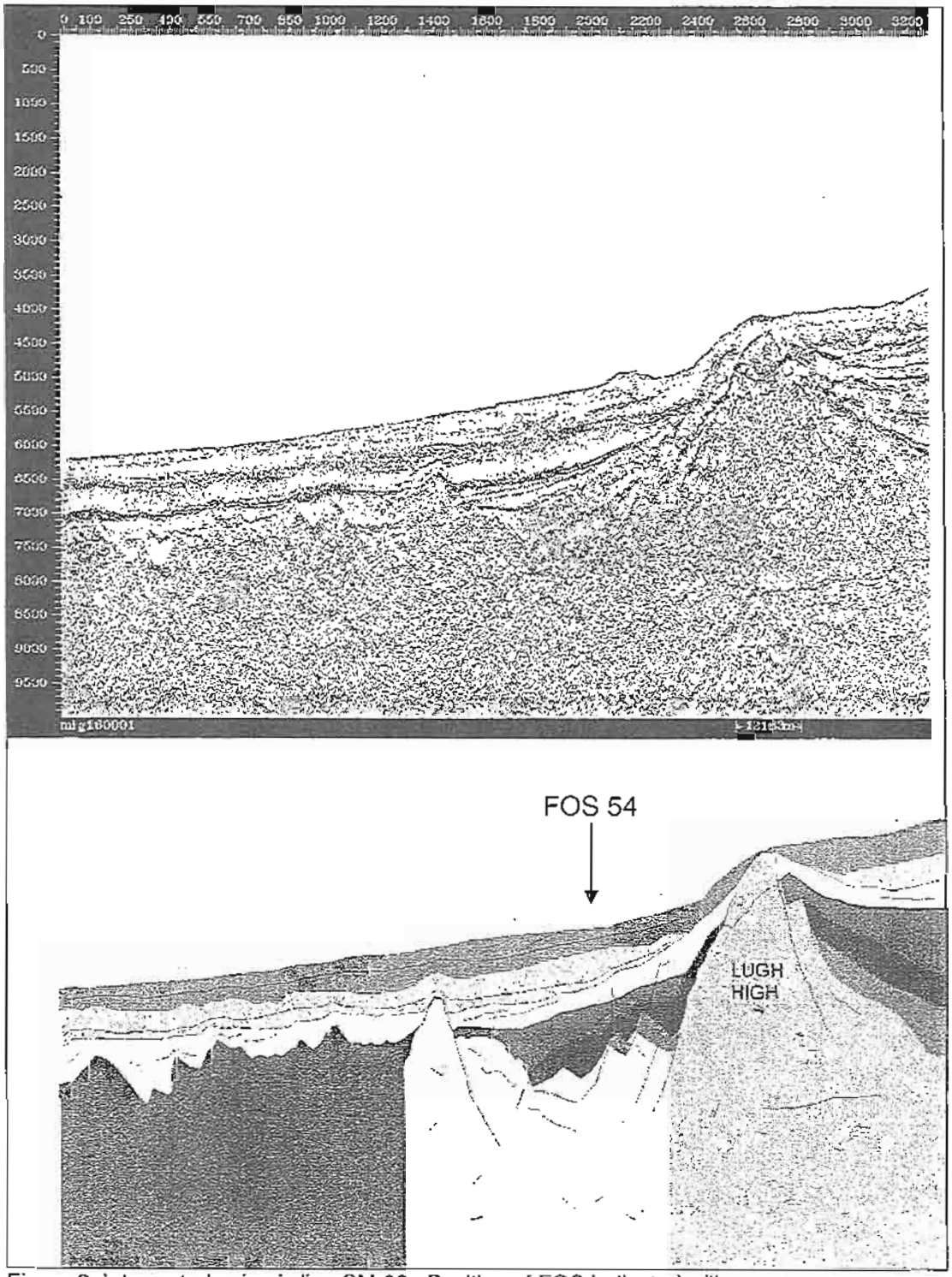


Figure 6: Interpreted seismic line CM-06. Position of FOS indicated with arrow.

Interpreted seismic line Shackleton A shows the down-faulted continental block (Fig. 7). Like the profile CM-06, the down-faulted lower crustal block is covered with seaward dipping sediments, indicative of a landward dipping fault. This profile shows the existence of two packages of these syn-rift sediments. The landward dipping normal faults seem to be restricted to the Porcupine Seabight area. It is likely that these faults are related to Triassic rifting that was responsible for the Porcupine Basin. The Porcupine Basin is bounded by landward dipping normal faults along the eastern side of the Porcupine Bank, and northward dipping faults along the northern side of the Goban Spur (Croker and Klemperer, 1989).

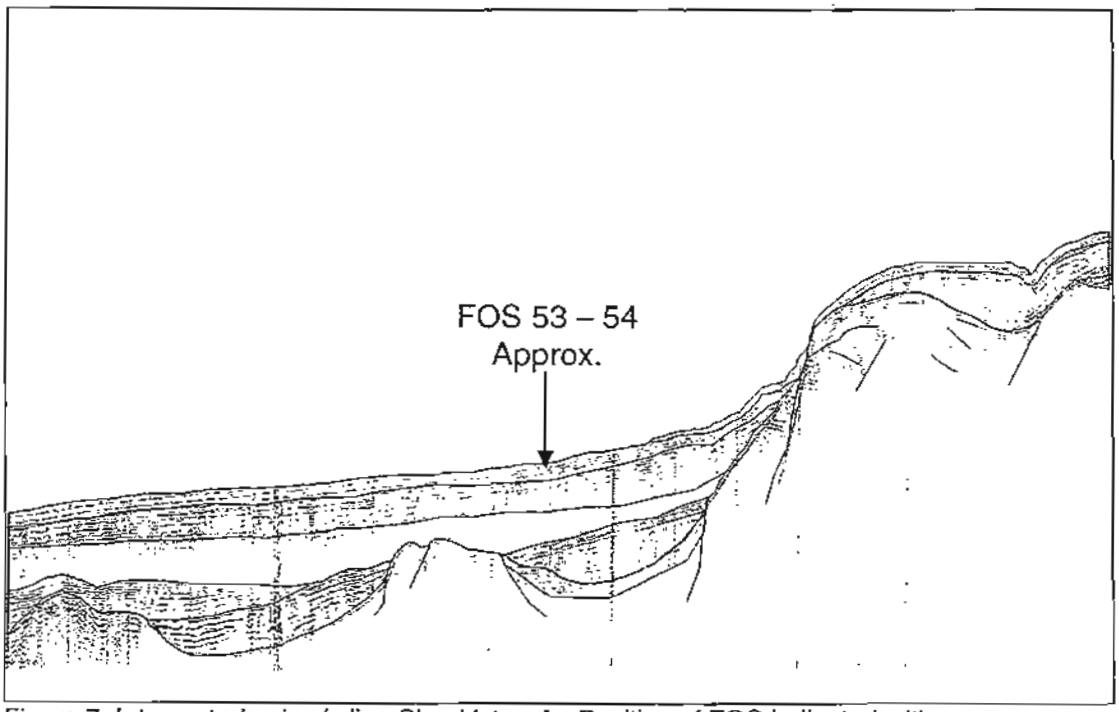


Figure 7: Interpreted seismic line Shackleton A. Position of FOS indicated with arrow.

Seismic line Shackleton B shows a relatively coherent lower continental crustal block down-faulted from the Porcupine Bank (Fig. 8). The tilted block is, in-turn, faulted by a number of smaller seaward dipping normal faults and is infilled with syn-rift sediments and overlain by Cretaceous post rift sediment. The tilted block displays the characteristic asymmetric basement morphology for continental crust. The OCT on this profile can be considered to begin at the base of the morphological shelf and continues seaward to where the basement morphology becomes rougher and symmetrical. This profile also displays features that indicate slope failure at the base of the morphological slope. This may indicate continued post-rift movement throughout the evolution of the margin.

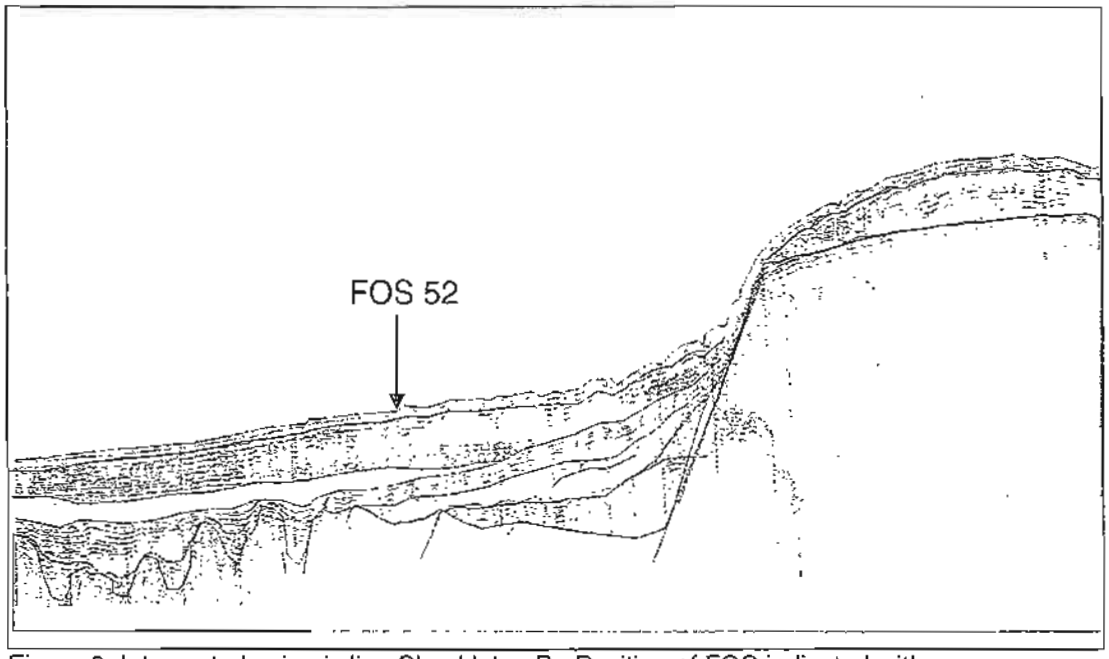


Figure 8: Interpreted seismic line Shackleton B. Position of FOS indicated with arrow.

Seismic line Shackleton G occurs between B & C (a result of the order they were shot in). The interpreted profile shows tilted blocks, which may be overlain by pre- and syn-rift sediments (Fig. 9). The OCT for the profile begins at the base of the morphologic slope and extends seawards to where the basement morphology becomes rougher and structurally lower. The occurrence of pre- and syn-rift sediments on top of the tilted blocks also indicates where the OCT is located. At the base of the morphological slope there is clear evidence of slope failure and modification of the slope by channels. This, again, suggests instability at the margin.

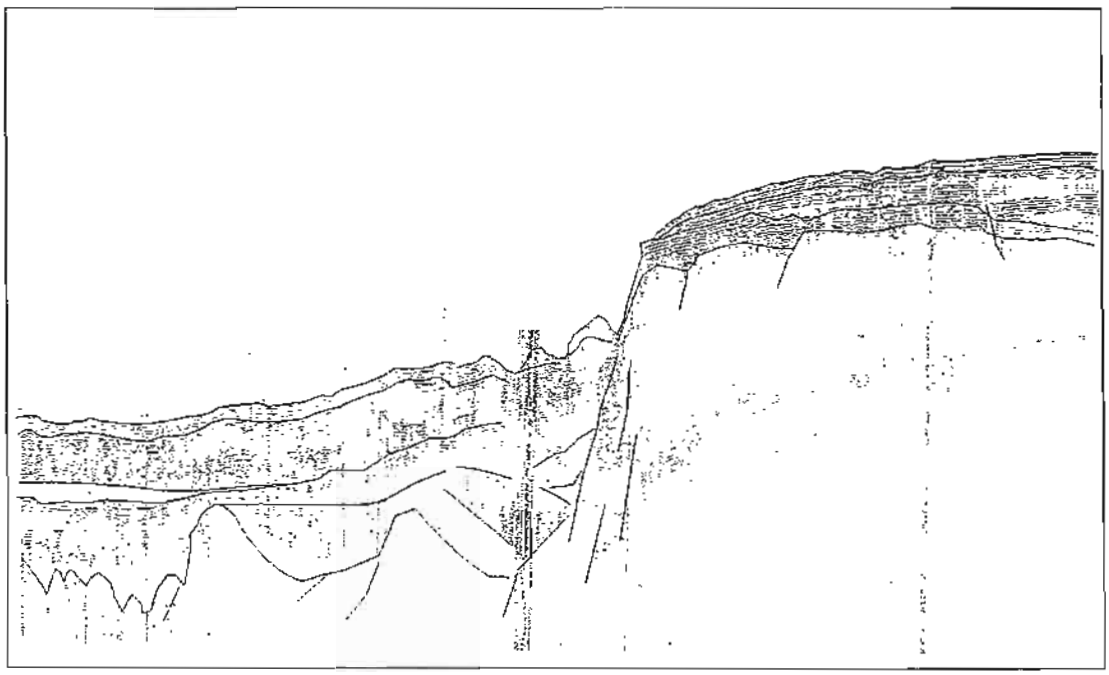


Figure 9: Interpreted seismic line Shackleton G. No FOS occurs along this profile.

Seismic profile Shackleton C has very poor data quality and therefore is of limited use in determining the OCT (Fig. 10). What can be observed from the profiles is the rough, irregular basement morphology of the oceanic crust. This gives an indication of the seaward and the landward extent of the OCT, which is consistent with the other profiles would be located close to the base of the morphological slope. This profile also illustrates slump features at the base of the morphological slope, which have been modified by channels.

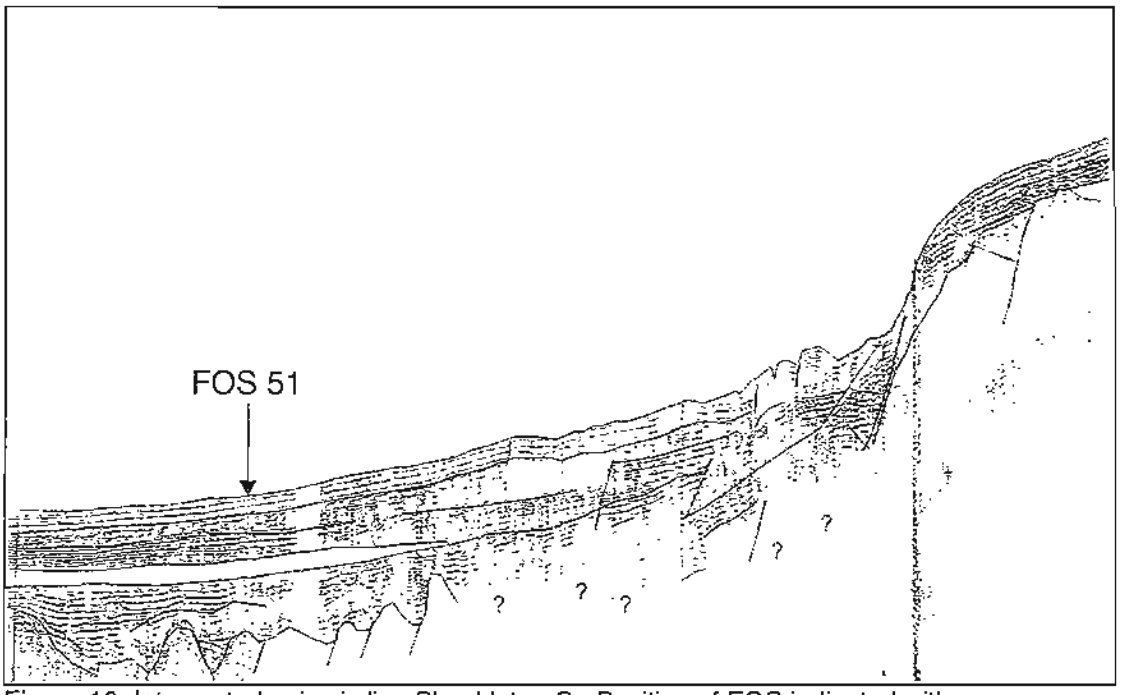


Figure 10: Interpreted seismic line Shackleton C. Position of FOS indicated with arrow.

Seismic profile Shackleton D illustrates a series of half-graben tilted blocks. These are overlain with pre- and syn-rift sediments (Fig. 11). This profile is the one closest to PAD95-13, described below in greater detail. In general, the same features are seen in this profile, including evidence for slope failures within the overlying sediments. The seabed also has the toe feature indicative of a slide or mass wasting event. This is, at least partially, controlled by the underlying crustal structure. The landward edge of the OCT occurs at the base of the morphological slope, while the seaward edge is located probably more seaward than is indicated below.

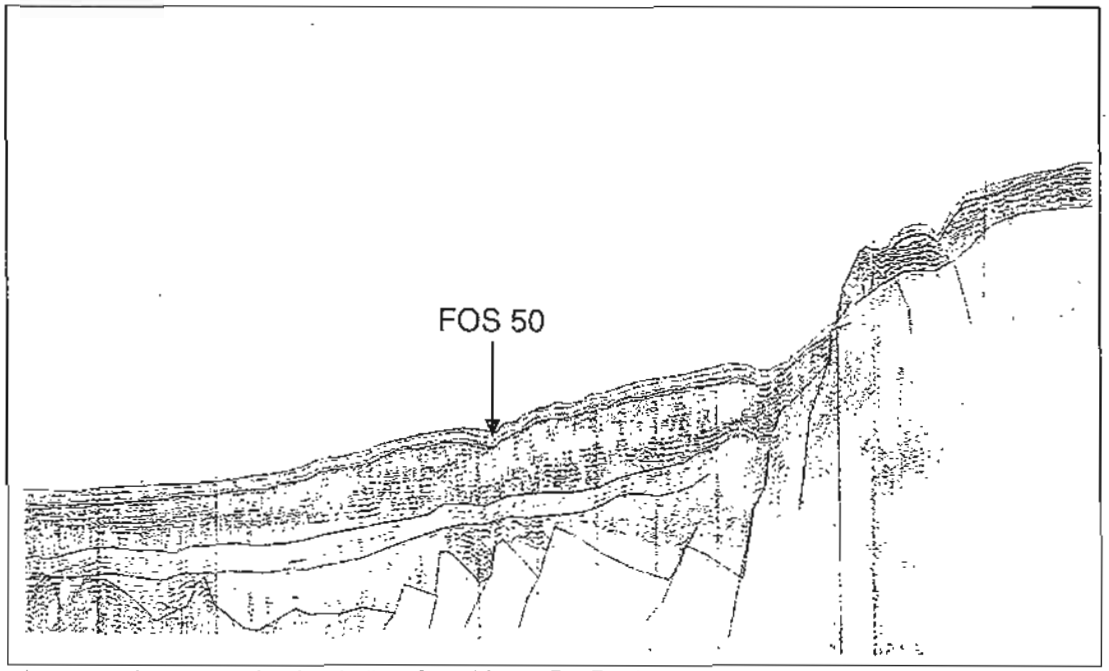


Figure 11: Interpreted seismic line Shackleton D. Position of FOS indicated with arrow.

Seismic profile Shackleton E shows a large down-faulted block, and what may be interpreted as an outer basement ridge or high (Fig. 12). The intervening basins are in-filled with pre- to syn-rift sediments. The overlying post-rift sediments illustrate a relatively sharp dip at the region of the basement high. This represents an underlying geological reason for the morphology of the seabed in this area. This point roughly corresponds to FOS 49 and therefore using it as a foot of slope selection is warranted. The OCT landward edge occurs at the base of the morphological slope and extends out beyond the second faulted block. Since there is no marked change in the basement character, it is difficult to place a seaward limit on it.

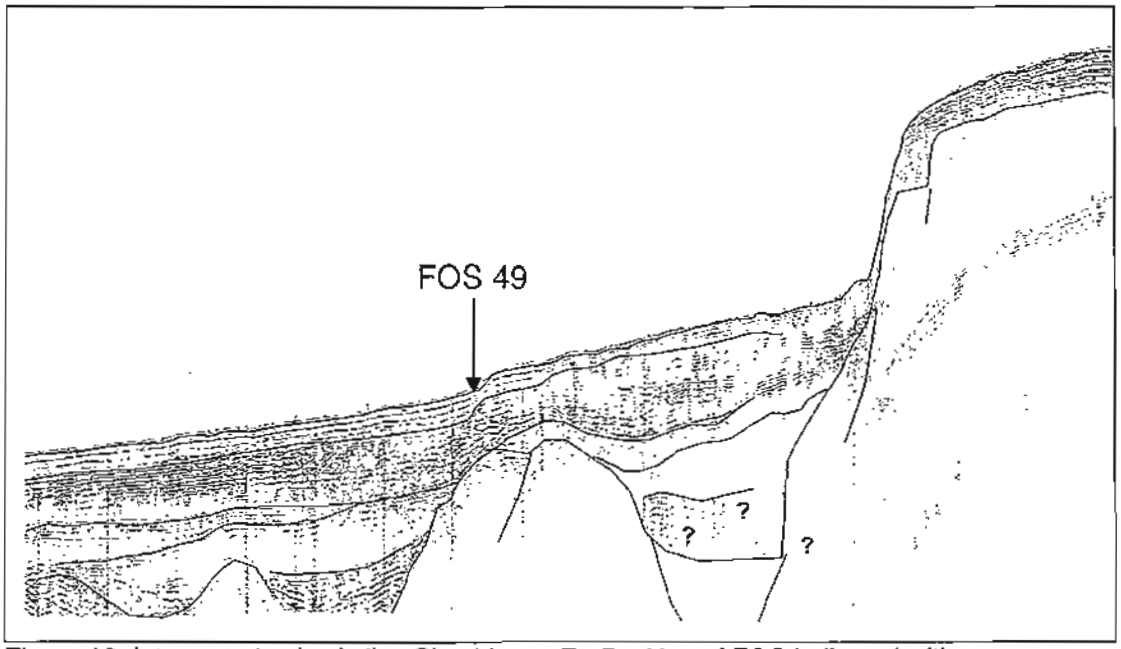


Figure 12: Interpreted seismic line Shackleton E. Position of FOS indicated with arrow.

Seismic profile Shackleton F occurs just south of the Rockall Trough (Fig. 13). As with previous profiles along the margin, it shows a series of tilted blocks seaward of the Porcupine Bank. A partially down-faulted block that occurs as a spur off of the Porcupine Bank is clearly seen on this profile. This is evidence for down-faulting of continental crustal blocks, which, for much of the margin have become buried. The OCT for the profile begins at the base of the lower down-faulted block and extends seaward to an obvious seamount feature. The lower slope is apparent and distinct from the rise in this profile and is controlled by the basement morphology of the down-faulted tilted blocks.

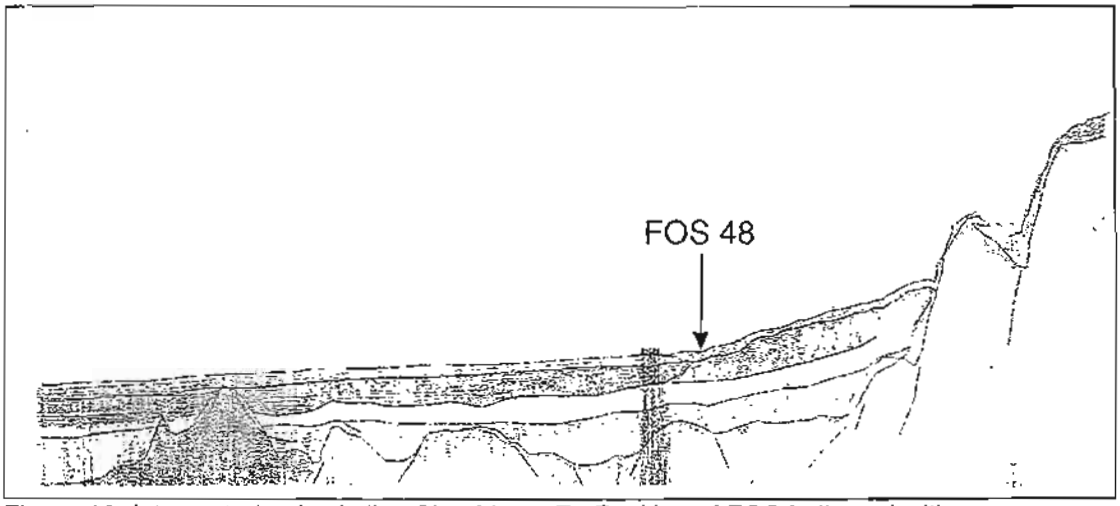


Figure 13: Interpreted seismic line Shackleton F. Position of FOS indicated with arrow.

The seismic profile PAD95-13 is a key line in understanding the nature of the continental margin along the Porcupine Bank (Fig. 14). The profile extends from the Porcupine Bank out to the Porcupine Abyssal Plain, and crosses the entire

ocean-continent transition and the C34 magnetic anomaly in the oceanic crust. The interpreted seismic profile shows a series of seaward dipping normal faults at the base of the Porcupine Bank. These faults bind a series of half-graben rotated blocks that have been downthrown in a seaward direction. The dip of the overlying sediment is landward. This implies the deposition of pre to syn-rift sediments on top of these tilted blocks, thereby constraining them to pre-Atlantic opening (Jurassic?). These have generally poor reflectivity and may resemble basement in places. These sediments are constrained to these inner tilted blocks and do not occur further westwards overlying known oceanic crust. The tilted blocks, and overlying sediments are in turn overlain by syn-rift sediments that infill the intervening sub-basins between the tilted blocks. While having bounding upper and lower surfaces, they generally lack internal reflectivity, probably a result of poor layering within the sediment, as they likely consist of initial slope failure sediments. These tilted blocks being clearly pre-rift in origin, and morphologically having a different appearance to the oceanic crust further westwards, make up the ocean-continent transition zone on PAD95-13. Close to the Porcupine Bank the lowermost post-rift sediments (Lower Cretaceous) overlie the OCT. These extend out to the C34 anomaly and appear to contain the large slope failure feature identified below. The rest of the sedimentary sequence (Upper Cretaceous to Neogene) is relatively consistent along the profile. The location of the C34 anomaly also aids in constraining the seaward edge of the OCT.

A noticeable feature on the seismic profiles along the Irish continental margin is the evidence for multiple slope failures and their associated deposits. This appears to have occurred throughout the evolution of the passive margin and varies from a single coherent sheet failure to catastrophic rock falls at the base of the morphological upper slope.

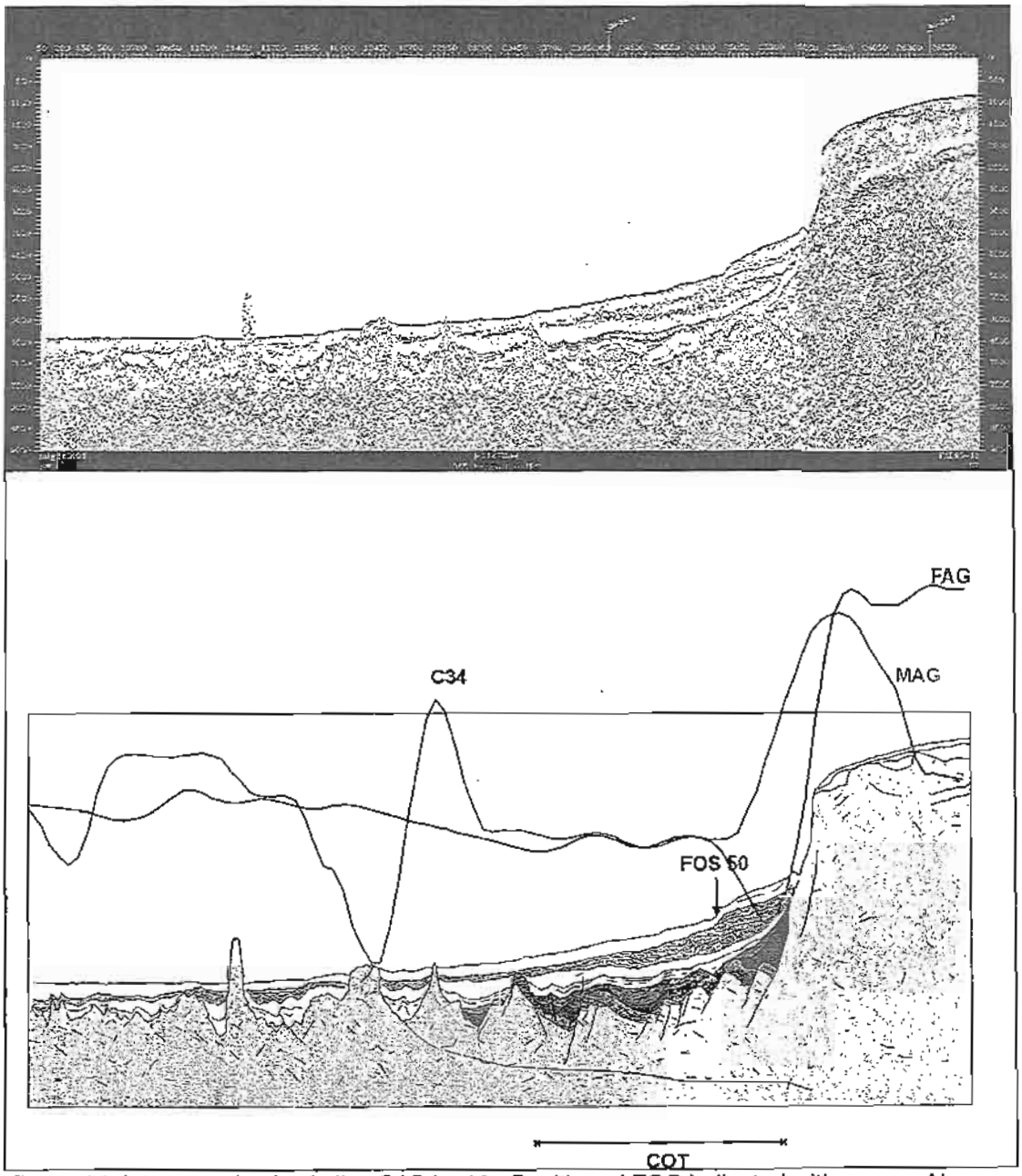


Figure 14: Interpreted seismic line PAD95-13. Position of FOS indicated with arrow. Also marked is the position of the C34 anomaly and the magnetic and free air gravity profiles along the seismic line.

Morphological Considerations

The morphology of the Irish continental margin in the area of the Porcupine Bank and western Goban Spur is relatively consistent. The gradients for the area have been previously described (IRL-LETT-03-09_Sept_2005, IRL-DOC-08-17_Oct_2005 and IRL-DOC-10-25_Jan_2006) and show a distinct abyssal plain, continental rise, a complex two-segment continental slope and continental shelf. As has been demonstrated by the seismic evidence, the morphology of the lower slope region is intimately linked to the underlying crustal structure of the OCT. This structure typically consists of tilted blocks, and asymmetrical structural highs and lows. The lower slope, with its steeper gradients, has undergone extensive slope modification, through slumping, sliding, rock-falls, mass-wasting and incision by channels. These processes are inherently continental slope processes, rather than rise processes. A good example of this is a slide feature along the Namibian continental slope (Fig. 15) and the Baltimore Canyon (Fig. 16), which shows many of the same features as can be seen in PAD95-13.

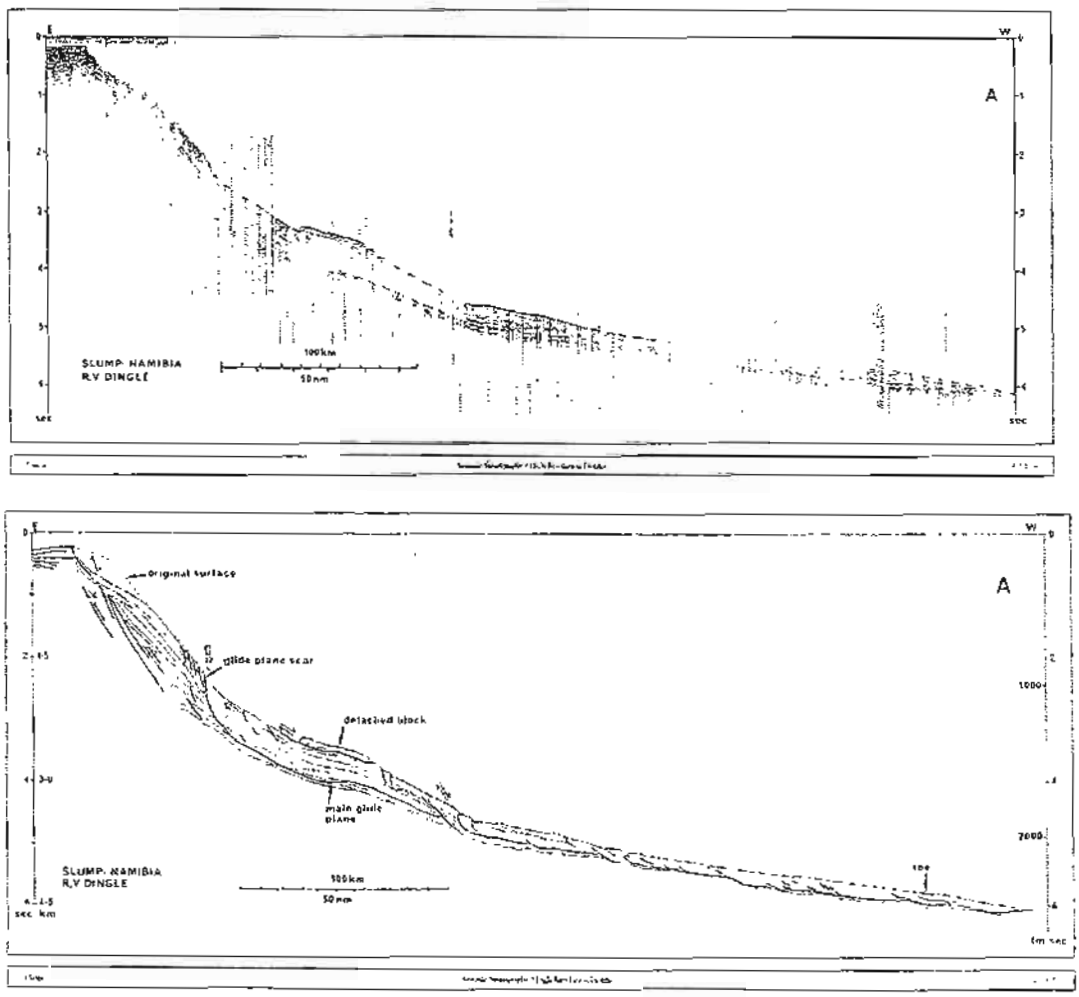


Figure 15: Slope failure processes along the Namibian continental slope (from Bally, 1983).

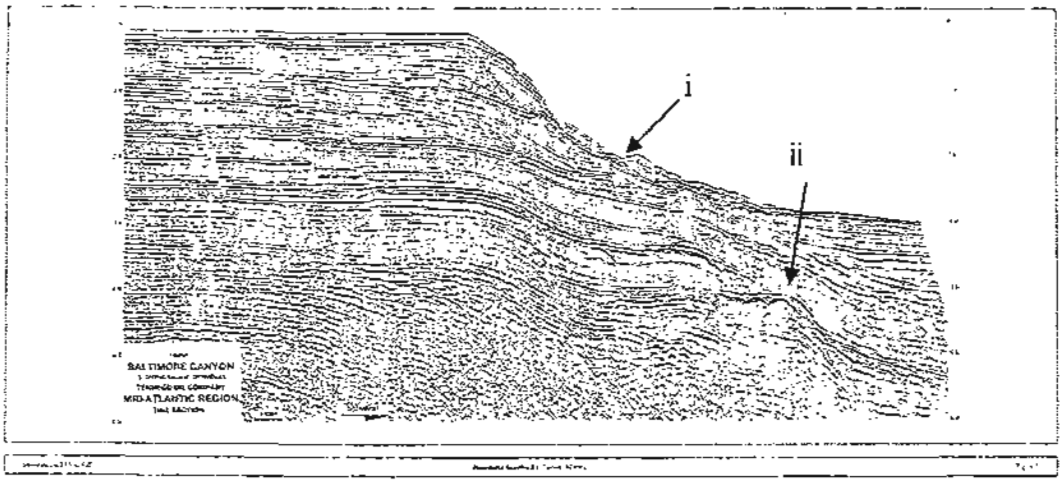


Figure 16: Continental margin along the Baltimore Canyon, Eastern USA. Note the slope failure deposits along the continental slope (i) and the lower shelf zone below the morphological foot of slope (ii), (from Bally, 1983).

Figure 17, below illustrates a southward-directed view along the Irish continental margin. The toe of the slide feature is clearly visible as is the increased gradient of the lower slope. The most important feature to note is that the distance of the ledge of the lower slope from the morphological shelf edge is consistent down the entire length of the margin and corresponds to the outer edge of the Pendragon Terrace. The Pendragon Terrace represents a down-faulted block that is structurally higher than the rest of the margin and therefore has a clear morphological expression. In order to truly appreciate the consistency of the edge of the lower slope, we have generated a 3D flythrough of the Irish continental margin. The foot of slope points are marked on the DTM for clarity. Other features that separate the lower slope from the rise/deep ocean floor are the presence of extensive submarine canyons that indent the lower slope and effectively transport sediment to the rise. The resulting sediment fan can be easily discerned from the image below.

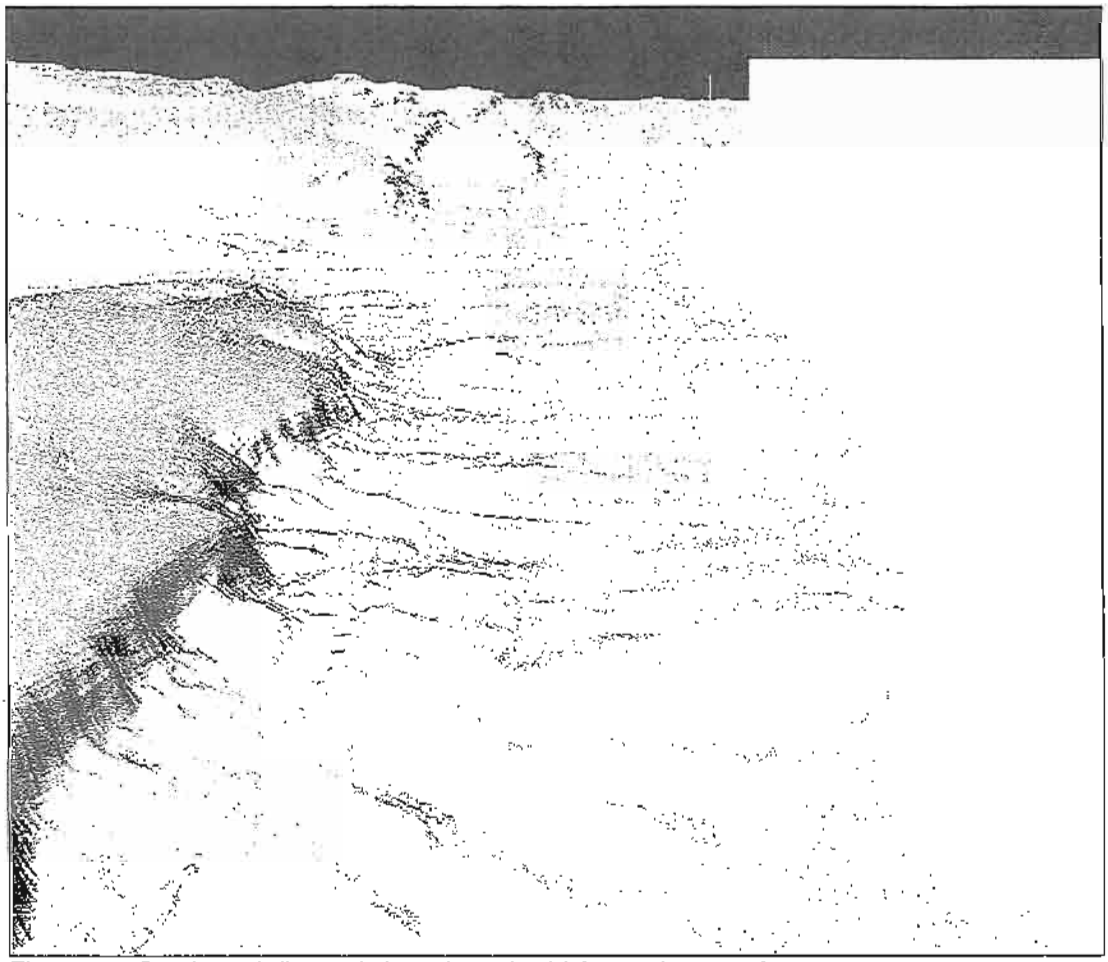


Figure 17: Southward-directed view along the Irish passive margin.

Key Conclusions

- A distance of 40 – 120 km exists between the morphological edge of the continental margin and the first recognisable named magnetic anomaly (C34).
- The OCB can be placed at gravity low on the free air gravity map.
- The continental margin displays down-faulted crustal blocks along its entire length.
- These:
    - May have a morphological expression (e.g. Pendragon Terrace, CM-10).
    - May be partially buried (WI-23).
    - May be completely buried (Shackleton lines, PAD95-13).
- Down-faulted blocks occur at a consistent distance from the morphological foot of slope.
- Lower slope morphology determined by underlying crustal structure.
- Lower slope extensively modified by submarine canyons and slope failure processes.

Discussion

A key reason for establishing the foot of the continental slope at the maximum change in gradient is that it best reflects the geological outer limit of the continental shelf and therefore is a fair assessment of the contact between oceanic crust and continental crust. In very general cases, this is the situation and the foot of the continental slope coincides with the geological boundary between the two crustal types. In an ideal picture, at passive non-volcanic margins, sediment builds up along the seaward edge of the continental shelf, thereby extending the morphological shelf seaward and burying down-faulted tilted blocks and structurally lower continental shelf components. This is the structure of the continental margin, for example off the African continental shelf (Fig. 18) or off of the eastern North American seaboard where a foot of slope point, selected at the base of these sediments would be approximately coincident with the outer edge of the geological continental shelf, as the post-rift sediments would overlie the down-faulted tilted blocks.

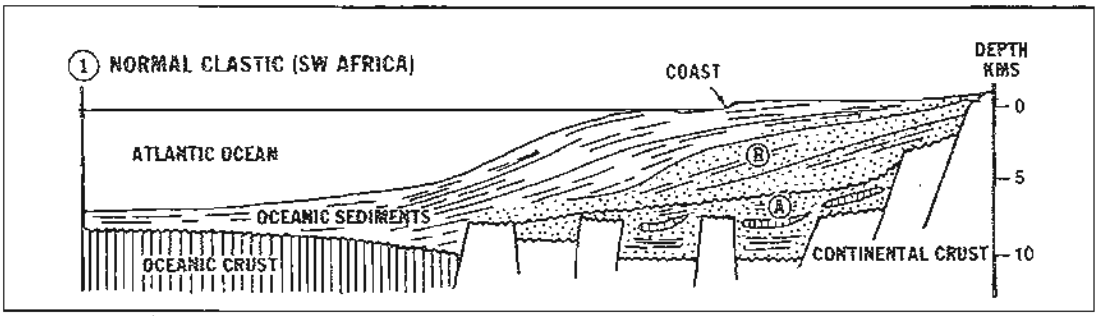


Figure 18: Diagram illustrating margin off of African continental shelf. Note how the cover of sediment places the morphological FOS at the geological limit of the continental shelf. (Modified from Symonds et al., 2000)

The Irish non-volcanic continental margin is, as demonstrated, relatively sediment starved. The morphological edge of the continental shelf represents the beginning of the OCT fault zone that can extend out 40 to 120km from the morphological break at the base of the morphological slope. This manifests itself as a steep scarp, with little or no sediment accumulation on top of it. This is what we have identified previously as the upper slope region and has gradients sometimes in excess of 45° (IRL-DOC-10-25_Jan_2006). The continental shelf tilted blocks, which are subsequently covered by pre-rift to post-rift sediments, occur in what we have previously identified as the lower slope region.

The lower continental crustal blocks, indicated by all seismic profiles along the Irish continental margin, have the effect of pushing seaward the geological limit of the continental margin. The structural evolution of the passive margin has had a direct influence on the sedimentary composition and morphology of the lower continental slope. This has had the effect of generating a morphological feature at the end of the lower slope for much of the continental margin. This morphological effect takes the form of a slide, or other slope failure feature as observed on the Porcupine Bank margin; or banked up sediment as seen on the

Goban Spur margin. The Irish Foot of Slope points are, in general located along these morphological features.

"2.1.13. Whereas the point of maximum change in the gradient at its base identifies the position of the foot of the continental slope as a general rule, the Commission is bound by this provision to examine all additional evidence provided by a coastal State for the identification of alternative points to locate the foot of the continental slope."

As has been pointed out by the Subcommission, the current base of slope designations and maximum changes of gradient within them do not yield the foot of slope points as proposed by Ireland. The process of refining the base of slope region to the lower slope segment, thereby excluding the maximum change in gradient between the upper and lower slope segments, is not specifically provided for in the CLCS Guidelines.

We therefore propose, as provided for under CLCS guideline 5.4.12 using a change in gradient, within the previously defined base of slope region, that is not the maximum. We have presented evidence that the continental margin extends beyond the morphological shelf. In light of this evidence, we propose that the foot of slope points represent the best, and fairest, approximation of the seaward edge of continental crust. The identification of the Foot of Slope points was carried out using morphological methods as has been outlined in the Submission, documents (Submission of Ireland, Part III, IRL-DOC-08-17_Oct_2005 and IRL-DOC-10-25_Jan_2006) and letters (IRL-LETT-02-08_Sept_2005, IRL-LETT-03-09_Sept_2005). We here present evidence to the contrary of the foot of slope points being located at the maximum change in gradient.

CLCS Guideline 6.4

In providing evidence to the contrary to the general rule (i.e. a point other than the maximum change in gradient), the Commission has outlined four key questions that shall be addressed (CLCS Guidelines 6.4). These shall be addressed below in order to aid the Commission in its consideration of the evidence presented:

"(i) Is that evidence acceptable to the Commission?"
Evidence regarding the geological structure and composition of the Irish continental margin has been presented in both the Submission of Ireland and this document. This evidence consists of interpretation of available seismic data, potential field data and morphological DTMs. The evidence demonstrates the prolongation of the continental shelf beyond the morphological continental (upper) slope. Morphological evidence has previously been presented to identify the multiple changes in gradient within the defined base of slope region.

"(ii) Does that evidence pertain to the identification of the foot of the continental Slope? Is that evidence purely bathymetric and/or morphological?"
The geological and geophysical evidence does not pertain to the exact location of the foot of the continental slope point. It pertains to the nature and composition of the underlying crustal material and structure of the continental crust within a "non-ideal" continental margin. The morphological evidence is provided to indicate the multiple possibilities for the location of the foot of the continental slope.

"(iii) Does that evidence include subsurface information aimed at establishing that the limit obtained by the rule of maximum change in gradient would not, for example, equate to the limit of the geological continental margin"
As mentioned above, the evidence contains significant subsurface information to illustrate the nature of the underlying crust. This evidence demonstrates that the maximum change in gradient at the base of the continental slope does NOT equate to the limit of the continental margin.

"(iv) If such evidence to the contrary is presented as part of a submission, the Commission will request that it be also accompanied by the results of applying the rule of maximum change in gradient."
The results of applying the maximum change in gradient have been outlined in documents previously provided to the Subcommission (IRL-DOC-08-17_Oct_2005). It is clear from the evidence presented here that the foot of slope (i.e. the geological limit of the continental margin) is located at a change in gradient that is not the maximum.

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Q. 21. Comparison of Interval Velocities derived from CDP Stacking Velocities and DSDP Drill Holes

The following analysis shows the results of comparing the calculated interval velocities from all available seismic data (Table 1) with measured sonic velocities from Deep Sea Drilling Program drill sites in the region. All of the DSDP drill sites are from Leg 80 and consist of four sites; 548, 549, 550 and 551. Sonic velocity data for the DSDP sites can be obtained from http://www.ngdc.noaa.gov/mgg/geology/dsdp/data/ as text files and are also attached digitally.

The results of this analysis show a relatively good match between the interval velocities from the seismic data and the sonic velocities from the DSDP sites. The values that do not match well can be attributed to the higher velocities associated with the basaltic bodies. The shallow nature of the drill sites (300 – 800m depth) means that only the top-most velocity analyses can be compared. However, even with this limited dataset, a good overall impression of the accuracy of the seismic-derived velocity data in the region is obtained.

Figure 1 shows the results of plotting the velocity analysis from CM-18 against the DSDP Site 548. All of the measured sonic velocities fall in a straight line between the topmost two velocity analyses from CM-18 indicative of accurate stacking-derived interval velocities for the area.

Figure 2 shows the results of plotting the velocity analysis from WAM-3, WAM-4 and CM-10 against DSDP Site 549. The measured sonic velocities show a significant spread in the data, probably the result of mafic intrusives in the region; however all the seismic velocity analyses, particularly CM-10, show a relatively good match with them. CM-10 significantly shows the increased velocities at 3404m depth, indicative of localised mafic (higher velocity) intrusives.

Figure 3 shows the results of plotting the velocity analysis from CM-11 and PAD95-16 against DSDP Site 550. The measured sonic velocities confirm the derived velocities from the seismic data with all of the data points lying along the same trend. Most importantly, seismic line PAD95-16 shows a very good match with the sonic velocities from DSDP Site 550. This, along with the analysis performed in IRL-DOC-07-09_Sept_2005, indicates that the velocity analyses for the PAD95 survey are quite accurate and give a reasonable estimate for the time to depth conversion for the purposes of defining the 1% sediment thickness point.

Figure 4 shows the results of plotting the velocity analysis from CM-10 and WAM-3 against DSDP Site 551. The sonic velocities show a cluster of high velocity data at ~4035m that is not apparent in the seismic velocities. These high velocities correspond to the altered basalts encountered in the lower parts of DSDP Site 551 (de Graciansky et al, 1984), which were perhaps too thin to be picked up by the seismic velocity analysis.

From the multiple seismic data sources it can be seen that reasonable seismic stacking-derived interval velocities can be achieved throughout the area. The exception to this may be the localised regions where thin discontinuous mafic intrusives occur. This, however, is not the case for the PAD95 survey and in general, as is the case for the DSDP Site 610 and PAD95-09, the stacking derived interval velocities are quite reliable and certainly in the accepted error range of +/- 10% as prescribed by CLCS Guideline 8.3.11.

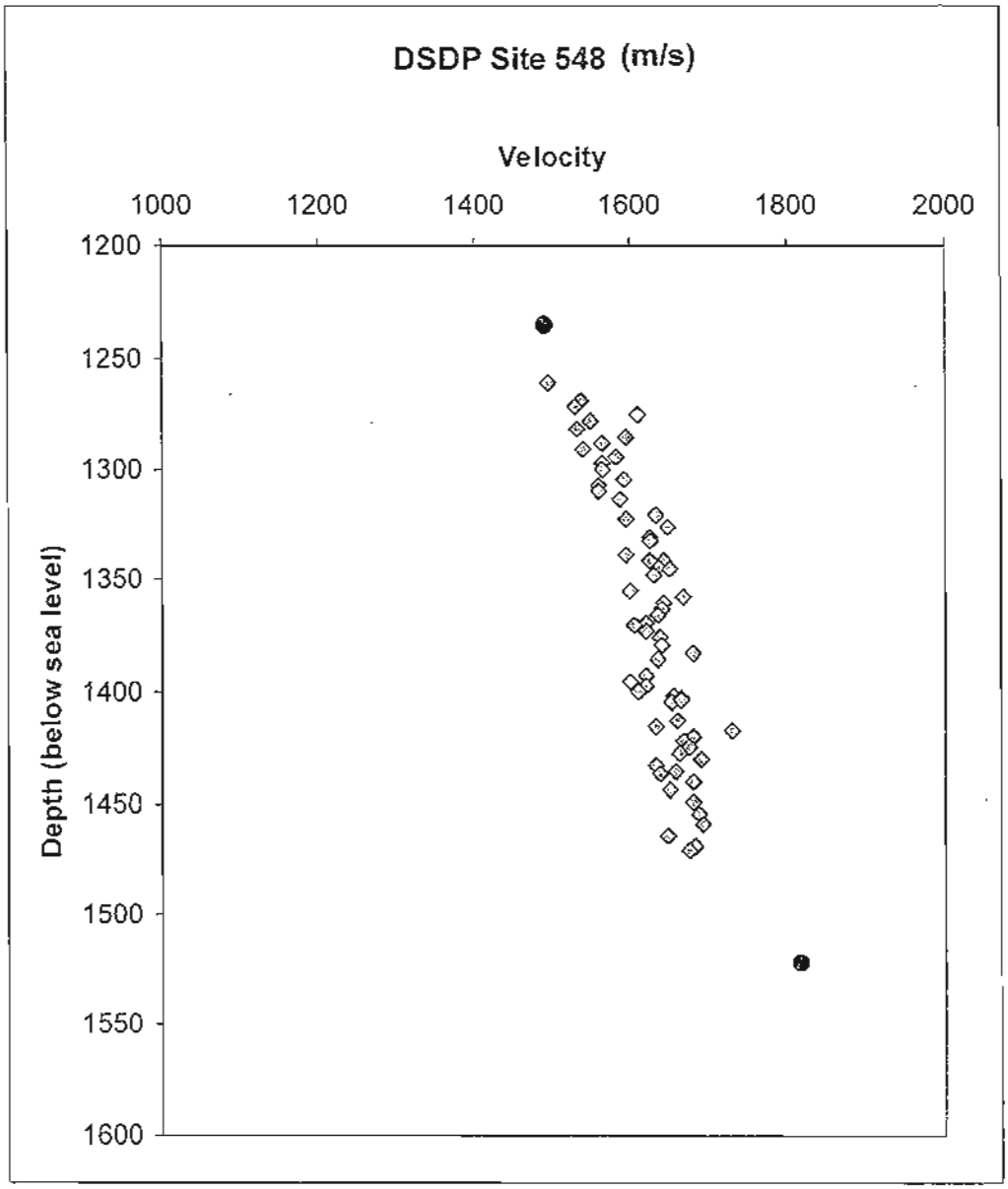

Figure 1: Comparison of sonic velocities from DSDP Site 548 (grey diamonds) with calculated interval velocities from CDP 1620 from seismic line CM-18 (black circles).

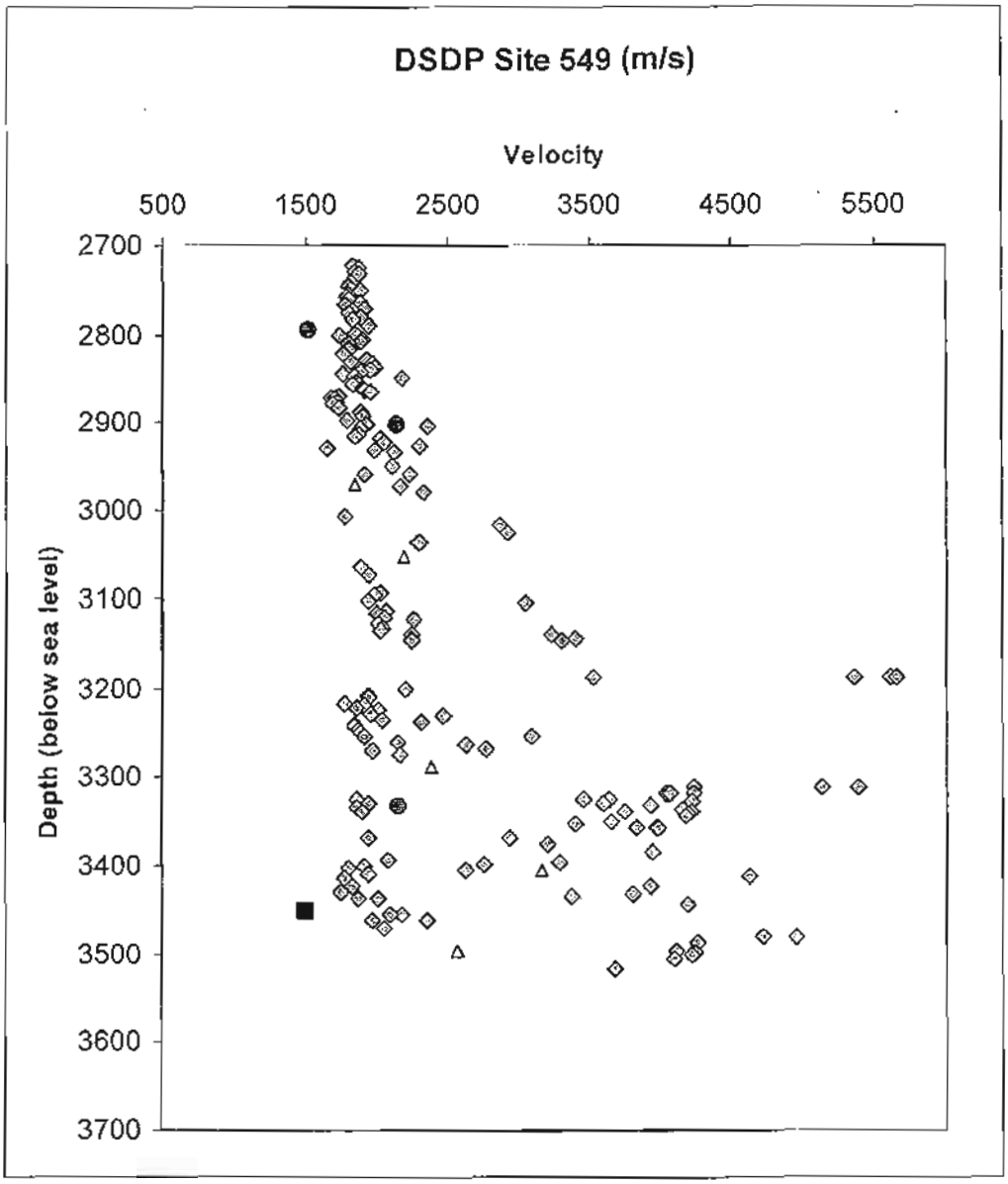

Figure 2: Comparison of sonic velocities from DSDP Site 549 (grey diamonds) with calculated interval velocities from SPN 3750 from seismic line WAM-4 (black circles), SPN 3364 from seismic line WAM-3 (black squares) and CDP 4446 from CM-10 (white triangles).

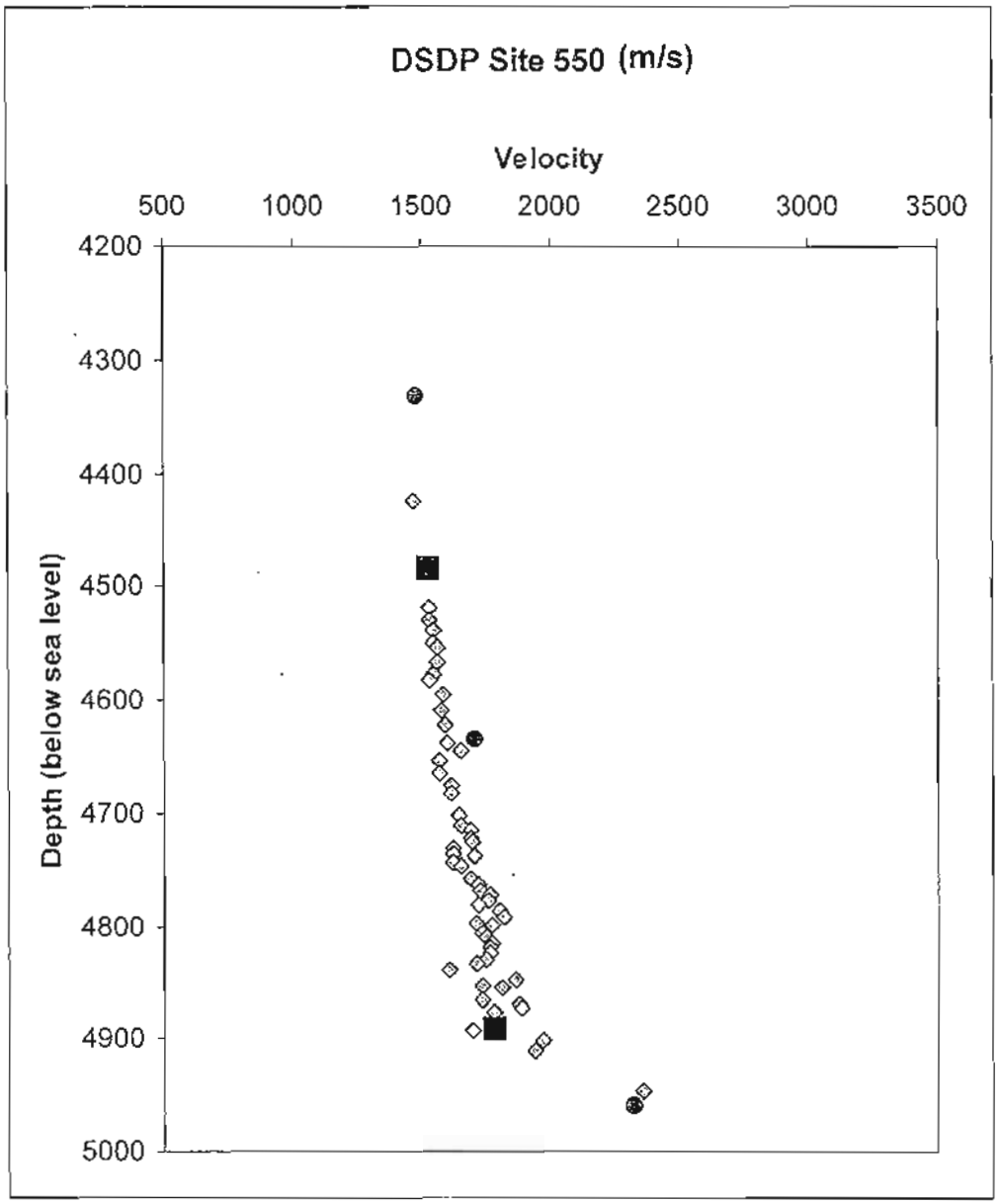

Figure 3: Comparison of sonic velocities from DSDP Site 550 (grey diamonds) with calculated interval velocities from CDP 1610 from seismic line PAD95-16 (black circles) and CDP 2974 from seismic line CM-11 (black squares).

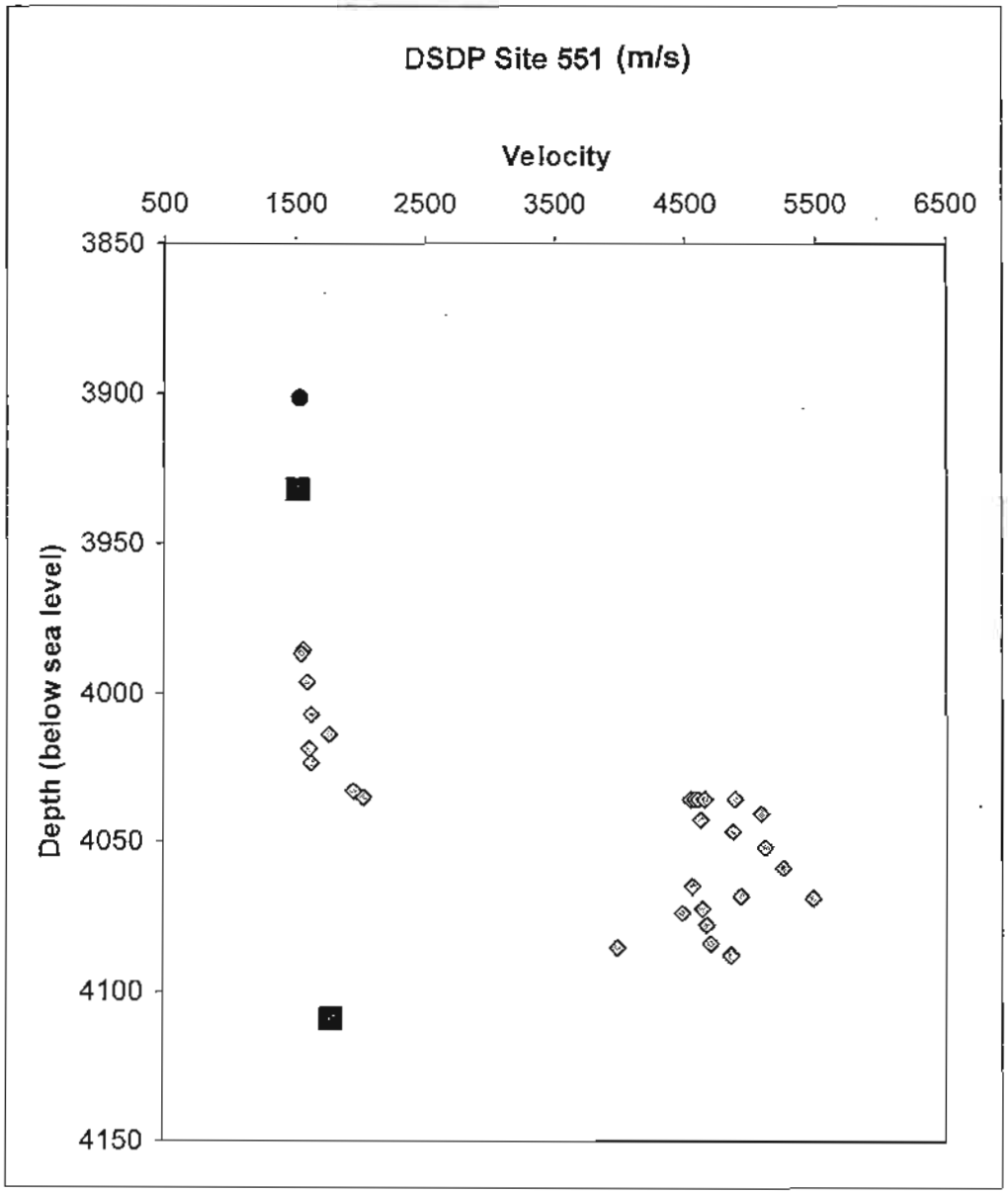

Figure 4: Comparison of sonic velocities from DSDP Site 551 (grey diamonds) with calculated interval velocities from CDP 3880 from seismic line WAM-3 (black circles) and CDP 2994 from seismic line CM-10 (black squares).

	TWTT	V_{RMS}	V_{INT}	z_{int}	z(l)	v_{avg}	Depth
PAD95-16	0	1480	0	0	0	0	0
SP 583	5852	1480	1480	4330480	4330480	1480	4330
CDP 1610	6208	1494	1708	303982	4634462	1493	4634
	6488	1539	2323	325168	4959629	1529	4960
	6880	1626	2684	525970	5485600	1595	5486
	7267	1755	3291	636900	6122499	1685	6122
	7850	2225	5317	1549819	7672319	1955	7672
	8521	2892	6949	2331487	10003806	2348	10004
	10000	4446	9245	6836467	16840273	3368	16840
Line CM 11	0	1480	0		0	0	0
SP 1470.5	5916	1515	1515	4481370	4481370	1515	4481
CDP 2974	6375	1535	1773	406833	4888203	1534	4888
	6531	1545	1909	148931	5037134	1543	5037
	6714	1570	2290	209536	5246670	1563	5247
	6823	1620	3528	192293	5438963	1594	5439
	8000	2000	3460	2036437	7475400	1869	7475
	10000	2700	4522	4522168	11997568	2400	11998
	12000	3200	4999	4999000	16996568	2833	16997
Line WAM 03	0	1480	0	0	0	0	0
SP 3064	5100	1530	1530	3901500	3901500	1530	3902
CDP 3880	5500	1560	1901	380291	4281791	1557	4282
	5700	1600	2457	245683	4527473	1589	4527
	6800	1900	3008	1654660	6182133	1818	6182
	7700	2700	5924	2665825	8847959	2298	8848
	8900	3800	7767	4659925	13507884	3035	13508
	15000	5900	8033	24500854	38008738	5068	38009
Line CM 10	0	1480	0	0	0	0	0
SP 1480.5	5207	1510	1510	3931285	3931285	1510	3931
CDP 2994	5408	1520	1759	176815	4108100	1519	4108
	5635	1545	2052	232952	4341053	1541	4341
	5825	1580	2396	227608	4568661	1569	4569
	6112	1625	2360	338606	4907268	1606	4907
	6224	1660	3005	168279	5075547	1631	5076
	6920	1810	2816	980019	6055566	1750	6056
	8025	2045	3139	1734474	7790040	1941	7790
	12000	3350	5043	10023837	17813878	2969	17814
CM-18		1480	0		0	0	0
CDP 1620	1658	1490	1490	1235210	1235210	1490	1235
	1974	1547	1817	287086	1522296	1542	1522
	2077	1597	2359	121470	1643765	1583	1644
	2237	1666	2387	190968	1834733	1640	1835

	2263	1703	3691	47986	1882719	1664	1883
	2404	1961	4361	307443	2190163	1822	2190
	2592	2282	4756	447106	2637269	2035	2637
	12000	4600	5055	23779671	26416940	4403	26417
Line WAM 03	0	1480	0		0	0	0
SP 3364	4600	1500	1500	3450000	3450000	1500	3450
	5000	1600	2475	494975	3944975	1578	3945
	5500	1720	2635	658711	4603686	1674	4604
	5800	1850	3454	518119	5121805	1766	5122
	8500	4100	6750	9113083	14234888	3349	14235
	12000	5400	7691	13459407	27694295	4616	27694
	15000	6000	7960	11939849	39634144	5285	39634
Line WAM 04A	0	1480	0		0	0	0
SP 3750	3700	1510	1510	2793500	2793500	1510	2794
	3800	1530	2143	107127	2900627	1527	2901
	4200	1600	2154	430880	3331508	1586	3332
	4680	1680	2262	542973	3874481	1656	3874
	6300	3300	5848	4736693	8611174	2734	8611
	10000	4500	6016	11128838	19740011	3948	19740
	15000	6000	8216	20539596	40279607	5371	40280
Line CM 10	0	1500	0		0	0	0
SP 2206	3524	1500	1500	2643000	2643000	1500	2643
CDP 4446	3879	1535	1847	327808	2970808	1532	2971
	3952	1550	2205	80477	3051286	1544	3051
	4150	1600	2388	236435	3287720	1584	3288
	4224	1640	3156	116757	3404477	1612	3404
	4296	1660	2574	92679	3497156	1628	3497
	5028	1965	3217	1177472	4674628	1859	4675
	5452	2225	4227	896168	5570796	2044	5571
	5683	2350	4361	503714	6074510	2138	6075
	6216	2590	4399	1172276	7246786	2332	7247
	12000	3900	4934	14269873	21516659	3586	21517

Table 1: Interval velocity calculations for selected seismic lines.

Sediment thickness values for SPs on lines PAD95-12 and PAD95-13 and distances to the foot of the slope (PAD95-12: FOS46 and PAD95-13: FOS50). Mean interval velocity minus 10% is used to calculate the final 1% sediment thickness.

Line	SPN	Latitude	Longitude	Mean Thickness (m)	+10%	-10%	Distance D (m)	D/100	-10%-D/100
SPAD95-12	4780	51-02-19.14N	17-29-25.55W	1357.732	1493.505	1221.960	119088.474	1190.88474	31.0753
SPAD95-12	4781	51-02-18.43N	17-29-27.11W	1349.148	1484.063	1214.234	119125.939	1191.25939	22.9746
SPAD95-12	4782	51-02-17.73N	17-29-28.69W	1340.013	1747.015	1206.120	119163.694	1191.63694	14.4831
SPAD95-12	**4783**	**51-02-17.03N**	**17-29-30.26W**	**1331.713**	**1464.884**	**1198.542**	**119201.102**	**1192.01102**	**6.5310**
SPAD95-12	4784	51-02-16.32N	17-29-31.82W	1324.316	1456.748	1191.885	119238.567	1192.38567	-0.5007
SPAD95-12	4785	51-02-15.62N	17-29-33.39W	1317.269	1449.000	1185.540	119276.067	1192.76067	-7.2207

Line	SPN	Latitude	Longitude	Mean Thickness (m)	10%	-10%	Distance D (m)	D/100	-10%-D/100
SPAD95-13A	11725	50-14-52.40N	16-42-12.76W	1257.773	1383.550	1131.996	120033.742	1200.33742	-68.3416
SPAD95-13A	11726	50-14-53.13N	16-42-11.24W	1266.896	1393.586	1140.206	119996.099	1199.96099	-59.7545
SPAD95-13A	11727	50-14-53.88N	16-42-09.74W	1272.200	1399.420	1144.980	119958.555	1199.58555	-54.6052
SPAD95-13A	11728	50-14-54.63N	16-42-08.24W	1275.736	1403.309	1148.162	119920.882	1199.20882	-51.0467
SPAD95-13A	11729	50-14-55.39N	16-42-06.76W	1279.155	1407.071	1151.240	119883.307	1198.83307	-47.5935
SPAD95-13A	11730	50-14-56.13N	16-42-05.28W	1283.033	1411.336	1154.730	119846.115	1198.46115	-43.7314
SPAD95-13	11731	50-14-56.85N	16-42-03.77W	1286.731	1415.404	1158.058	119808.793	1198.08793	-40.0297
SPAD95-13	11732	50-14-57.58N	16-42-02.25W	1292.308	1421.539	1163.078	119771.151	1197.71151	-34.6339
SPAD95-13	11733	50-14-58.29N	16-42-00.71W	1301.288	1431.417	1171.159	119733.635	1197.33635	-26.1770
SPAD95-13	11734	50-14-58.99N	16-41-59.16W	1310.850	1441.935	1179.765	119696.15	1196.9615	-17.1965
SPAD95-13	11735	50-14-59.69N	16-41-57.59W	1320.924	1453.016	1188.831	119658.216	1196.58216	-7.7507
SPAD95-13	**11736**	**50-15-00.38N**	**16-41-56.05W**	**1331.234**	**1464.357**	**1198.110**	**119621.083**	**1196.21083**	**1.8997**
SPAD95-13	11737	50-15-01.08N	16-41-54.52W	1341.143	1475.257	1207.029	119583.76	1195.8376	11.1912
SPAD95-13	11738	50-15-01.79N	16-41-52.97W	1351.109	1486.220	1215.998	119545.988	1195.45988	20.5380
SPAD95-13	11739	50-15-02.51N	16-41-51.43W	1364.617	1501.079	1228.156	119508.281	1195.08281	33.0727
SPAD95-13	11740	50-15-03.21N	16-41-49.89W	1378.353	1516.188	1240.517	119470.958	1194.70958	45.8079

Co-ordinates of Fixed Points used to define the Outer Limits of the Extended Shelf in the area abutting the Porcupine Abyssal Plain

FP	Latitude	Longitude	Corresponding FOS Point	Base of Slope Region	Method	From FP	To FP	Distance (m)	Distance(M)
1	51.0369536	-17.4934128	FOS 46	Mouth of Rockall Trough	1% Sediment Thickness				
2	50.2489863	-16.7005384	FOS 50	Porcupine Bank	1% Sediment Thickness	1	2	104059.81	56.19
3	50.0691902	-16.5126452	FOS 51	Porcupine Bank	FOS + 60M	2	3	2487.96	13.01
4	50.0554937	-16.4979397	FOS 51	Porcupine Bank	FOS + 60M	3	4	1852.44	1.00
5	50.0419552	-16.4828907	FOS 51	Porcupine Bank	FOS + 60M	4	5	1851.16	1.00
6	50.0285778	-16.4675026	FOS 51	Porcupine Bank	FOS + 60M	5	6	1852.19	1.00
7	50.0153645	-16.4517798	FOS 51	Porcupine Bank	FOS + 60M	6	7	1852.39	1.00
8	50.0023213	-16.4357247	FOS 51	Porcupine Bank	FOS + 60M	7	8	1851.77	1.00
9	49.9894483	-16.4193439	FOS 51	Porcupine Bank	FOS + 60M	8	9	1851.66	1.00
10	49.9767514	-16.4026397	FOS 51	Porcupine Bank	FOS + 60M	9	10	1852.03	1.00
11	49.9642336	-16.3856211	FOS 51	Porcupine Bank	FOS + 60M	10	11	1852.06	1.00
12	49.9518981	-16.3682904	FOS 51	Porcupine Bank	FOS + 60M	11	12	1851.30	1.00
13	49.9397464	-16.3506497	FOS 51	Porcupine Bank	FOS + 60M	12	13	1851.87	1.00
14	49.9277843	-16.3327081	FOS 51	Porcupine Bank	FOS + 60M	13	14	1852.44	1.00
15	49.7118147	-16.0163304	FOS 53	Porcupine Bank	FOS + 60M	14	15	33096.75	17.87
16	48.8652140	-15.2474220	FOS 57	Northern Goban Spur	FOS + 60M	15	16	109516.02	59.13
17	48.0979064	-14.6273868	FOS 60	Western Goban Spur	FOS + 60M	16	17	96855.74	52.30
18	48.0833284	-14.6153696	FOS 60	Western Goban Spur	FOS + 60M	17	18	1852.03	1.00
19	48.0688832	-14.6029975	FOS 60	Western Goban Spur	FOS + 60M	18	19	1852.35	1.00
20	48.0545769	-14.5902751	FOS 60	Western Goban Spur	FOS + 60M	19	20	1851.25	1.00
21	48.0404143	-14.5772069	FOS 60	Western Goban Spur	FOS + 60M	20	21	1852.57	1.00
22	48.0263984	-14.5637951	FOS 60	Western Goban Spur	FOS + 60M	21	22	1851.18	1.00
23	48.0170407	-14.5545155	FOS 60	Western Goban Spur	FOS + 60M	22	23	1249.93	0.67

Article 76 Provisions Used to Deter.. ..ie the Foot of the Continental Slope

FOS Number	FOS Latitude (N)	FOS Longitude (W)	Provision of Article 76(4)(b) Invoked	OLFP Generated	Supporting Documents	Remarks (Relevant Seismic Data)	Remarks (Base of Slope Region)
46	51.65841301	-16.09671619	Maximum Change in Gradient	FP 1	Submission of Ireland, Part III	CM-04, PAD95-12	Mouth of the Rockall Trough
47	51.54741947	-15.74599818	Evidence to the Contrary	N/A	IRL-DOC-11-10_Apr_2006	N/A	Porcupine Bank
48	51.33017832	-15.68313183	Evidence to the Contrary	N/A	IRL-DOC-11-10_Apr_2006	Shackleton F	Porcupine Bank
49	51.12526740	-15.51648761	Evidence to the Contrary	N/A	IRL-DOC-11-10_Apr_2006	Shackleton E	Porcupine Bank
50	50.88480239	-15.33589929	Evidence to the Contrary	FP 2	IRL-DOC-11-10_Apr_2006	PAD95-13 Shackleton D	Porcupine Bank
51	50.62316217	-15.21351281	Evidence to the Contrary	FP 3 TO FP 14	IRL-DOC-11-10_Apr_2006	Shackleton C	Porcupine Bank
52	50.52392851	-14.88326741	Evidence to the Contrary	N/A	IRL-DOC-11-10_Apr_2006	Shackleton B	Porcupine Bank
53	50.27943098	-14.74099224	Evidence to the Contrary	FP 15	IRL-DOC-11-10_Apr_2006	Shackleton A*	Porcupine Bank
54	50.17672294	-14.30684095	Evidence to the Contrary	N/A	IRL-DOC-11-10_Apr_2006	PAD95-14, CM-06, Shackleton A*	Gollum Channel
55	50.03761461	-13.86159323	Evidence to the Contrary	N/A	IRL-DOC-11-10_Apr_2006	WI-19, CM-07	Gollum Channel
56	49.64175121	-13.95187391	Evidence to the Contrary	N/A	IRL-DOC-11-10_Apr_2006	CM-08 Dingle & Scrutton 15	Gollum Channel
57	49.34822306	-13.91514629	Evidence to the Contrary	FP 16	IRL-DOC-11-10_Apr_2006	Scrutton 7*	Northern Goban Spur
58	49.25501839	-13.69829074	Evidence to the Contrary	N/A	IRL-DOC-11-10_Apr_2006	PAD95-15, WI-23	Northern Goban Spur
59	48.89812122	-13.52787134	Maximum Change in Gradient	N/A	Submission of Ireland, Part III	CM-10, WAM, Dingle & Scrutton 5	Western Edge Goban Spur
60	48.56619382	-13.30341155	Maximum Change in Gradient	FP 17 TO FP 23	Submission of Ireland, Part III	PAD95-16, CM-11	Western Edge Goban Spur

* Seismic data not occurring exactly on the FOS point. For details see accompanying map in IRL-DOC-16-12_Apr_2006.

Q. 25 Additional seismic or other data required to support FOS 53 *per se* and FOS 57

As outlined in the presentation of the 10th April 2006, Ireland is not in possession of any further seismic data in the region of the current submission. We do however have previously interpreted seismic profiles from academic work carried out in the late 70's (Dingle and Scrutton, 1979).

These profiles, and in particular profile 7, display the same lower slope morphology as has been described along the entire Irish continental margin in IRL-DOC-11-10_Apr_2006 (Fig. 1). On profile 7, a lower down-faulted basin is interpreted by Dingle and Scrutton. This has been infilled with syn-rift (unit 1 in the figure), and younger, sediments. The authors have made no attempt to characterise basement type, although the structure of the basement in the lower section (i.e. a graben structure) is indicative of continental or transitional crust. It displays the outer ridge high seen in many of the seismic profiles all along the margin, including the outer edge of Pendragon Terrace. The seabed morphology of this profile is very similar to that seen in FOS profile 58, and FOS profile 57. This profile also suggests that underlying geological and structural features have a controlling effect on the morphology of the seabed. The other Dingle and Scrutton profiles (3, 5 and 15), while not immediately relatable to a FOS position also illustrate the down-faulted segmented nature of the Irish passive margin.

As outlined in the presentation of 10th April 2006, no seismic data exists on FOS 53. The closest seismic profile is Shackleton A, which occurs between FOS53 and FOS54. The interpolated position of the FOS is shown on Figure 7 of IRL-DOC-11-10_Apr_2006.

The seismic evidence outlined in IRL-DOC-11-10_Apr_2006 and this document aims to establish the geological nature and structure of the Irish continental margin. The location of the profiles relative to foot of slope points, while advantageous, are not strictly necessary when using 'evidence to the contrary'. The evidence that we have presented provides a coherent and consistent geological framework for the location of the outer geological edge of the continental crust. The selection of foot of slope points was achieved by selecting a change in gradient that occurs at the base of the lower morphological slope. Within the entire, previously defined base of slope region, this is not the maximum change in gradient, however; the geological model for the margin is evidence that it is a more realistic approximation of the outer edge of the continental shelf. The geological model, supported by seismic and potential field data in this document, and IRL-DOC-11-10_Apr_2006, is the evidence to the contrary of the FOS being located at the maximum change in gradient for FOS 47 – 58.

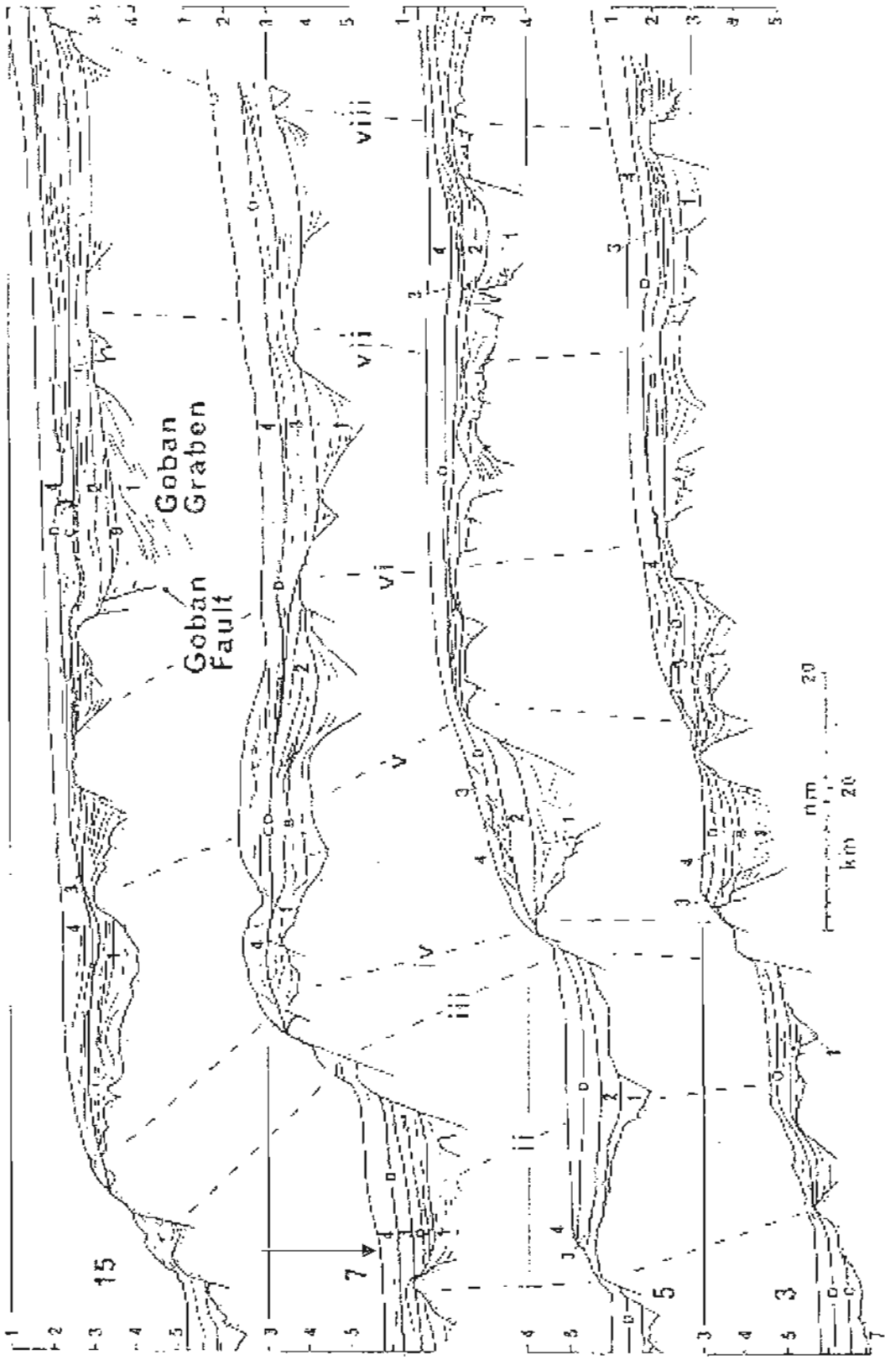

Figure 1: Four interpreted seismic profiles from Dingle and Scrutton (1979). For location of profiles see Figure 2. Red arrow indicates approximate position of the foot of slope.

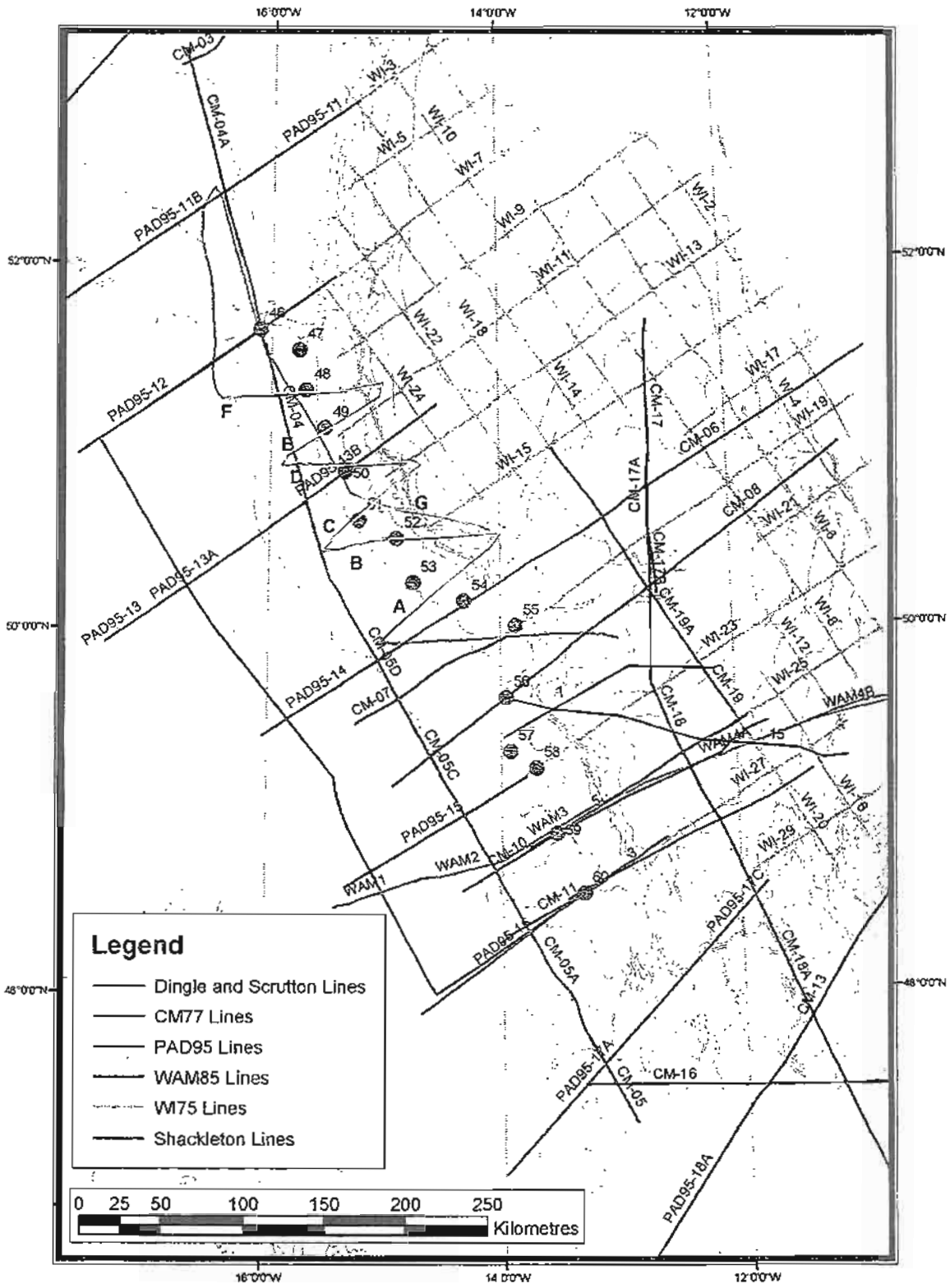

Figure 2: Location of all available seismic data along the Irish continental margin. Note the location of the Dingle and Scrutton seismic profiles presented in this document (shown in purple).

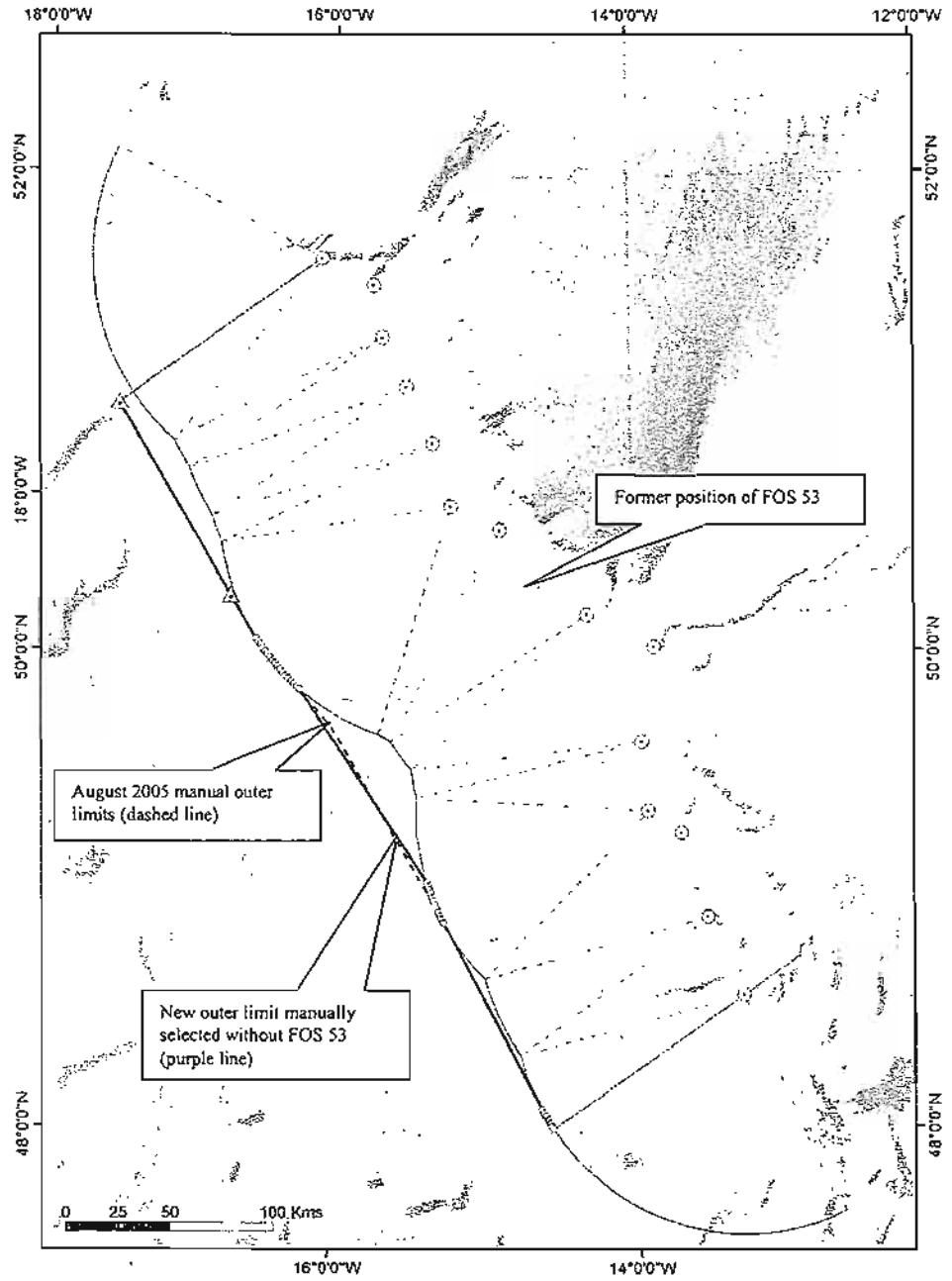

Figure 1 shows the manually selected outer limit without FOS 53.

Co-ordinates of Fixed Points used to define the Outer Limits of the Extended Shelf in the area abutting the Porcupine Abyssal Plain

FP	Latitude N	Longitude W	Method	Source	From FP	To FP	Distance (m)	Distance (M)
1	51.0369536	-17.4934128	1% Sediment Thickness	FOS 46				
2	50.2489863	-16.7005384	1% Sediment Thickness	FOS 50	1	2	104056.81	56.19
3	50.0691902	-16.5126452	FOS + 60M arc	FOS 51	2	3	24088.13	13.01
4	50.0554937	-16.4979397	FOS + 60M arc	FOS 51	3	4	1851.94	1.00
5	50.0419552	-16.4828907	FOS + 60M arc	FOS 51	4	5	1851.88	1.00
6	50.0285778	-16.4675026	FOS + 60M arc	FOS 51	5	6	1851.88	1.00
7	50.0153645	-16.4517798	FOS + 60M arc	FOS 51	6	7	1851.92	1.00
8	50.0023213	-16.4357247	FOS + 60M arc	FOS 51	7	8	1851.83	1.00
9	49.9894483	-16.4193439	FOS + 60M arc	FOS 51	8	9	1851.95	1.00
10	49.9767514	-16.4026397	FOS + 60M arc	FOS 51	9	10	1851.97	1.00
11	49.9642336	-16.3856211	FOS + 60M arc	FOS 51	10	11	1851.81	1.00
12	49.9518981	-16.3682904	FOS + 60M arc	FOS 51	11	12	1851.79	1.00
13	49.9397464	-16.3506497	FOS + 60M arc	FOS 51	12	13	1852.04	1.00
14	49.9277843	-16.3327081	FOS + 60M arc	FOS 51	13	14	1851.89	1.00
15	49.9160151	-16.3144701	FOS + 60M arc	FOS 51	14	15	1851.75	1.00
16	49.9044388	-16.2959378	FOS + 60M arc	FOS 51	15	16	1852.00	1.00
17	49.8930614	-16.2771204	FOS + 60M arc	FOS 51	16	17	1851.82	1.00
18	49.8818844	-16.2580199	FOS + 60M arc	FOS 51	17	18	1851.91	1.00
19	49.8709124	-16.2386410	FOS + 60M arc	FOS 51	18	19	1851.92	1.00
20	49.8601470	-16.2189926	FOS + 60M arc	FOS 51	19	20	1851.83	1.00
21	49.0478481	-15.3693211	FOS + 60M arc	FOS 57	20	21	109346.26	59.04
22	49.0320589	-15.3612745	FOS + 60M arc	FOS 57	21	22	1851.86	1.00
23	49.0163592	-15.3528370	FOS + 60M arc	FOS 57	22	23	1851.81	1.00
24	49.0007521	-15.3440066	FOS + 60M arc	FOS 57	23	24	1851.99	1.00
25	48.9852450	-15.3347876	FOS + 60M arc	FOS 57	24	25	1851.81	1.00
26	48.9698395	-15.3251846	FOS + 60M arc	FOS 57	25	26	1851.85	1.00
27	48.9545401	-15.3151976	FOS + 60M arc	FOS 57	26	27	1851.94	1.00
28	48.9393514	-15.3048333	FOS + 60M arc	FOS 57	27	28	1851.88	1.00
29	48.9242780	-15.2940895	FOS + 60M arc	FOS 57	28	29	1851.93	1.00
30	48.9093243	-15.2829750	FOS + 60M arc	FOS 57	29	30	1851.78	1.00
31	48.8944919	-15.2714901	FOS + 60M arc	FOS 57	30	31	1851.97	1.00
32	48.8797885	-15.2596368	FOS + 60M arc	FOS 57	31	32	1851.84	1.00
33	48.0979064	-14.6273868	FOS + 60M arc	FOS 60	32	33	98708.60	53.30
34	48.0833284	-14.6153696	FOS + 60M arc	FOS 60	33	34	1851.73	1.00
35	48.0688832	-14.6029975	FOS + 60M arc	FOS 60	34	35	1851.96	1.00
36	48.0545769	-14.5902751	FOS + 60M arc	FOS 60	35	36	1851.94	1.00
37	48.0404143	-14.5772069	FOS + 60M arc	FOS 60	36	37	1851.80	1.00
38	48.0263984	-14.5637951	FOS + 60M arc	FOS 60	37	38	1851.80	1.00
39	48.0170407	-14.5545155	FOS + 60M arc	FOS 60	38	39	1249.71	0.67

Co-ordinates of Fixed Points used to define the Outer Limits of the Extended Shelf in the area abutting the Porcupine Abyssal Plain

FP	Latitude N	Longitude W	Method	Source	From FP	To FP	Distance (m)	Distance (M)
1	51.0369536	-17.4934128	1% Sediment Thickness	FOS 46				
2	50.2489863	-16.7005384	1% Sediment Thickness	FOS 50	1	2	104059.81	56.19
3	50.0691902	-16.5126452	FOS + 60M arc	FOS 51	2	3	24088.13	13.01
4	50.0554937	-16.4979397	FOS + 60M arc	FOS 51	3	4	1851.94	1.00
5	50.0419552	-16.4828907	FOS + 60M arc	FOS 51	4	5	1851.88	1.00
6	50.0285778	-16.4675026	FOS + 60M arc	FOS 51	5	6	1851.88	1.00
7	50.0153645	-16.4517798	FOS + 60M arc	FOS 51	6	7	1851.92	1.00
8	50.0023213	-16.4357247	FOS + 60M arc	FOS 51	7	8	1851.83	1.00
9	49.9894483	-16.4193439	FOS + 60M arc	FOS 51	8	9	1851.95	1.00
10	49.9767514	-16.4026397	FOS + 60M arc	FOS 51	9	10	1851.97	1.00
11	49.9642336	-16.3856211	FOS + 60M arc	FOS 51	10	11	1851.81	1.00
12	49.9518981	-16.3682904	FOS + 60M arc	FOS 51	11	12	1851.79	1.00
13	49.9397464	-16.3506497	FOS + 60M arc	FOS 51	12	13	1852.04	1.00
14	49.9277843	-16.3327081	FOS + 60M arc	FOS 51	13	14	1851.89	1.00
15	49.9160151	-16.3144701	FOS + 60M arc	FOS 51	14	15	1851.75	1.00
16	49.9044388	-16.2959378	FOS + 60M arc	FOS 51	15	16	1852.00	1.00
17	49.8930614	-16.2771204	FOS + 60M arc	FOS 51	16	17	1851.82	1.00
18	49.8818844	-16.2580199	FOS + 60M arc	FOS 51	17	18	1851.91	1.00
19	49.8709124	-16.2386410	FOS + 60M arc	FOS 51	18	19	1851.92	1.00
20	49.8601470	-16.2189926	FOS + 60M arc	FOS 51	19	20	1851.83	1.00
21	49.0478481	-15.3693211	FOS + 60M arc	FOS 57	20	21	109346.26	59.04
22	49.0320589	-15.3612745	FOS + 60M arc	FOS 57	21	22	1851.86	1.00
23	49.0163592	-15.3528370	FOS + 60M arc	FOS 57	22	23	1851.81	1.00
24	49.0007521	-15.3440066	FOS + 60M arc	FOS 57	23	24	1851.99	1.00
25	48.9852450	-15.3347876	FOS + 60M arc	FOS 57	24	25	1851.81	1.00
26	48.9698395	-15.3251846	FOS + 60M arc	FOS 57	25	26	1851.85	1.00
27	48.9545401	-15.3151976	FOS + 60M arc	FOS 57	26	27	1851.94	1.00
28	48.9393514	-15.3048333	FOS + 60M arc	FOS 57	27	28	1851.88	1.00
29	48.9242780	-15.2940895	FOS + 60M arc	FOS 57	28	29	1851.93	1.00
30	48.9093243	-15.2829750	FOS + 60M arc	FOS 57	29	30	1851.78	1.00
31	48.8944919	-15.2714901	FOS + 60M arc	FOS 57	30	31	1851.97	1.00
32	48.8797885	-15.2596368	FOS + 60M arc	FOS 57	31	32	1851.84	1.00
33	48.0979064	-14.6273868	FOS + 60M arc	FOS 60	32	33	98708.60	53.30
34	48.0833284	-14.6153696	FOS + 60M arc	FOS 60	33	34	1851.73	1.00
35	48.0688832	-14.6029975	FOS + 60M arc	FOS 60	34	35	1851.96	1.00
36	48.0545769	-14.5902751	FOS + 60M arc	FOS 60	35	36	1851.94	1.00
37	48.0404143	-14.5772069	FOS + 60M arc	FOS 60	36	37	1851.80	1.00
38	48.0263984	-14.5637951	FOS + 60M arc	FOS 60	37	38	1851.80	1.00
39	48.0170407	-14.5545155	FOS + 60M arc	FOS 60	38	39	1249.71	0.67

Sediment thickness values for SPs on lines PAD95-12 and PAD95-13 and distances to the foot of the slope (PAD95-12: FOS46 and PAD95-13: FOS50). Mean interval velocity minus 10% is used to calculate the final 1% sediment thickness.

Line	SPN	ED50		WGS84		Mean Thickness (m)	10%	-10%	Distance D (m) WGS84	D/100	-10%-D/100
		Latitude	Longitude	Latitude	Longitude						
SPAD95-12	4780	51-02-19.14N	17-29-25.55W	51.0375397N	17.4921044W	1357.732	1493.505	1221.96	119258.155	1192.58155	29.37845
SPAD95-12	4781	51-02-18.43N	17-29-27.11W	51.0373425N	17.4925378W	1349.148	1484.063	1214.234	119295.621	1192.95621	21.27779
SPAD95-12	4782	51-02-17.73N	17-29-28.69W	51.0371480N	17.4929767W	1340.013	1747.015	1206.12	119333.157	1193.33157	12.78843
SPAD95-12	**4783**	**51-02-17.03N**	**17-29-30.26W**	**51.0369536N**	**17.4934128W**	**1331.713**	**1464.884**	**1198.542**	**119370.565**	**1193.70565**	**4.83635**
SPAD95-12	4784	51-02-16.32N	17-29-31.82W	51.0367563N	17.4938461W	1324.316	1456.748	1191.885	119408.124	1194.08124	-2.19624
SPAD95-12	4785	51-02-15.62N	17-29-33.39W	51.0365619N	17.4942822W	1317.269	1449	1185.54	119445.533	1194.45533	-8.91533

Line	SPN	ED50		WGS84		Mean Thickness (m)	10%	-10%	Distance D (m) WGS84	D/100	-10%-D/100
		Latitude	Longitude	Latitude	Longitude						
SPAD95-13A	11725	50-14-52.40N	16-42-12.76W	50.2467695N	16.7051801W	1257.773	1383.55	1131.996	120203.714	1202.03714	-70.04114
SPAD95-13A	11726	50-14-53.13N	16-42-11.24W	50.2469723N	16.7047578W	1266.896	1393.586	1140.206	120166.07	1201.6607	-61.4547
SPAD95-13A	11727	50-14-53.88N	16-42-09.74W	50.2471806N	16.7043412W	1272.2	1399.42	1144.98	120128.429	1201.28429	-56.30429
SPAD95-13A	11728	50-14-54.63N	16-42-08.24W	50.2473890N	16.7039245W	1275.736	1403.309	1148.162	120090.754	1200.90754	-52.74554
SPAD95-13A	11729	50-14-55.39N	16-42-06.76W	50.2476001N	16.7035134W	1279.155	1407.071	1151.24	120053.274	1200.53274	-49.29274
SPAD95-13A	11730	50-14-56.13N	16-42-05.28W	50.2478057N	16.7031023W	1283.033	1411.336	1154.73	120015.986	1200.15986	-45.42986
SPAD95-13	11731	50-14-56.85N	16-42-03.77W	50.2480057N	16.7026829W	1286.731	1415.404	1158.058	119978.758	1199.78758	-41.72958
SPAD95-13	11732	50-14-57.58N	16-42-02.25W	50.2482085N	16.7022606W	1292.308	1421.539	1163.078	119941.115	1199.41115	-36.33315
SPAD95-13	11733	50-14-58.29N	16-42-00.71W	50.2484057N	16.7018329W	1301.288	1431.417	1171.159	119903.599	1199.03599	-27.87699
SPAD95-13	11734	50-14-58.99N	16-41-59.16W	50.2486001N	16.7014023W	1310.85	1441.935	1179.765	119866.017	1198.66017	-18.89517
SPAD95-13	11735	50-14-59.69N	16-41-57.59W	50.2487946N	16.7009662W	1320.924	1453.016	1188.831	119828.179	1198.28179	-9.45079
SPAD95-13	**11736**	**50-15-00.38N**	**16-41-56.05W**	**50.2489863N**	**16.7005384W**	**1331.234**	**1464.357**	**1198.11**	**119790.95**	**1197.9095**	**0.2005**
SPAD95-13	11737	50-15-01.08N	16-41-54.52W	50.2491807N	16.7001134W	1341.143	1475.257	1207.029	119753.721	1197.53721	9.49179
SPAD95-13	11738	50-15-01.79N	16-41-52.97W	50.2493780N	16.6996829W	1351.109	1486.22	1215.998	119715.949	1197.15949	18.83851
SPAD95-13	11739	50-15-02.51N	16-41-51.43W	50.2495780N	16.6992551W	1364.617	1501.079	1228.156	119678.241	1196.78241	31.37359
SPAD95-13	11740	50-15-03.21N	16-41-49.89W	50.2497724N	16.6988273W	1378.353	1516.188	1240.517	119640.822	1196.40822	44.10878

Annex IV

Comments from other States regarding the data reflected in the executive summary of the partial Submission made by Ireland, including all charts and coordinates as made public by the Secretary-General in accordance with rule 50 of the rules of procedure of the Commission

PERMANENT MISSION OF DENMARK
TO THE UNITED NATIONS

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Consequently, the submission made by Ireland and the Commission's recommendations are without prejudice to any future submission made by Denmark nor to the delimitation of the continental shelf in the Hatton-Rockall area between Denmark/The Faroe Islands and Ireland.

The Permanent Mission of Denmark to the United Nations avails itself of this opportunity to renew to the Secretary-General of United Nations the assurances of its highest consideration.

New York, August 19, 2005

H.E. the Secretary-General
of the United Nations

New York

PERMANENT MISSION OF ICELAND
TO THE UNITED NATIONS

800 Third Avenue, 36th floor
New York, NY 10022
Tel: +1 212 593 2700, fax: +1 212 593 6269
unmission@mfa.is

Ref: UTN05080174/97.B.512

The Permanent Mission of Iceland to the United Nations presents its compliments to the Secretary-General of the United Nations and, with reference to his communication of 25 May 2005 (Continental Shelf Notification CLCS.04.2005.LOS) regarding receipt of the submission made by Ireland to the Commission on the Limits of the Continental Shelf, has the honour to submit the following observations by the Government of Iceland.

According to the United Nations Convention on the Law of the Sea, to which both Iceland and Ireland are Parties, including its Annex II, and the Rules of Procedure of the Commission on the Limits of the Continental Shelf, in particular Annex I thereto, the actions of the Commission shall not prejudice matters relating to delimitation of boundaries between States with opposite or adjacent coasts.

According to the executive summary of the submission made by Ireland, it is a partial submission in accordance with paragraph 3 of Annex I to the Rules of Procedure of the Commission, which reads as follows: "A submission may be made by a coastal State for a portion of its continental shelf in order not to prejudice questions relating to the delimitation of boundaries between States in any other portion or portions of the continental shelf for which a submission may be made later, notwithstanding the provisions regarding the ten-year period established by article 4 of Annex II to the Convention."

According to the quotation in the Secretary-General's communication, in the view of the Government of Ireland, "this portion of [the] shelf is not the subject of any dispute" and "... consideration [of the submission] by the Commission will not prejudice matters relating to the delimitation of boundaries between Ireland and any other States".

It is the position of the Government of Iceland that the submission made by Ireland and any recommendations by the Commission are without prejudice to any future submission made by Iceland with respect to the continental shelf in the Hatton-Rockall area and to the delimitation of the continental shelf in that area between Iceland and Ireland.

The Permanent Mission of Iceland to the United Nations avails itself of this opportunity to renew to the Secretary-General of the United Nations the assurances of its highest consideration.

Permanent Mission of Iceland
New York, 24 August 2005

United Nations Secretariat
Secretary-General
New York, NY