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Ministry of Earth Sciences, New Delhi.



Summary of Work Profile

A. Elucidation of Lithostratigraphy, Structure and tectonics of Proterozoic sequence of continental shield area of India

Undersigned worked in various positions with Geological Survey of India for 34 years between December 1971 and January 2006, taking up multifarious earth-science investigations in northwestern and northeastern shield area of India, Precambrian terrain of Bhutan and East Antarctica.

- **Northwestern India:**

Undertook detailed field and laboratory studies to update the geological data base on 1:25,000 scale for middle to late Proterozoic rock sequence exposed in Rajasthan. The work comprised geological mapping, analyses of structural and Petrological data to establish multiple tectonic and metamorphic events to which the rocks were subjected to. During the course of investigations new mineral occurrences were reported and a Memoir (No 110) listing the outcome of integrated studies published.

- **Northeastern India:**

Conducted evaluation and ground verification of airborne geophysical data collected over Shillong Plateau of Northeastern India. The Total Intensity Aeromagnetic maps were analyzed, tectonic and structural lineaments and geological data base integrated to establish the causative factors for generating the anomalies. The studies established existence of shear zones and intrusive mafic dykes in the area.

- **Bhutan:**

Between 1980 and 1983, undersigned was on deputation to Bhutan for undertaking geological mapping in the inaccessible, high altitude areas of Bhutan Himalayas. Three expeditions were launched to map the Precambrian geological terrain in Bhumthang, Tongsa and Dagar D'Zong areas of Bhutan which led to establishing Lithostratigraphy of

the rock sequence in hitherto unknown area and reporting of high grade limestone and graphite occurrences.

- **East Antarctica:**

An area of nearly 3,000 sq km covering anorthosite, charnockite, magmatic gneiss, quartzite and other high grade metamorphic rocks belonging to older Proterozoic sequence was geologically mapped between 1987 and 1997 during different scientific expeditions that were undertaken by Government of India. Pan-African tectono-thermal events, responsible for intrusion of A-Type granite, were dated through Rb-Sr geochronology. The results have been published in the form of three Geological and Geomorphologic maps of Schirmacher Oasis and Humboldt group of Mountains of Central Dronning Maud land of east Antarctica, as also in several scientific peer reviewed journals.

B. Offshore Marine geological and geophysical studies

During the tenure of undersigned as Director of the National Centre for Antarctic and Ocean Research, for the period between 2006 and 2012, undersigned guided and supervised following scientific programs that added to understanding of crustal evolution of the off-shore areas.

- **Legal Continental Shelf Program of Ministry of Earth Sciences of India**

The data acquired from Comprehensive marine geophysical survey that saw profiling of nearly 28,000 line km of multi-channel seismic (MCS) reflection, gravity, magnetic data and deployment of 72 Ocean-bottom seismometers (OBS) along some of the critical seismic sections was analyzed to understand the bathymetry and nature of bed rock as also to constrain the MCS velocities and develop crustal model of the study area. The analyses and interpretation of the requisite scientific and technical information was documented to define the country's extended shelf boundaries.

- **Submission of India's partial claims as per UNCLOS provisions**

Based on the detailed analyses and interpretation of the data acquired from the above mentioned marine geophysical surveys, India submitted the country's first partial submission for an extended continental shelf beyond 200 M to the UN Commission on the Limits of the Continental Shelf (CLCS), under the provisions of article 76, on the 11th May 2009. A formal presentation by India to this affect as made on 16th August 2010 before the Commission on LCS at UN HQ in New York. The work on the technical documentation for a second partial submission under the provisions of the Statement of Understanding was also completed and is currently under scrutiny by MEA.

- **Evaluation of the extended Indian legal continental shelf:**

Major marine geophysical studies were planned for comprehensive evaluation of the geological and structural evolution of the Arabian Sea and the Bay of Bengal sectors of the northern and north-western Indian Ocean with an aim to address several intriguing geological/geophysical problems such as delineation of the continental/ oceanic crust boundary on the Indian plate, both off the Western and Eastern offshore, Offshore extension of the Deccan Volcanics, Imprints and implications of hot spots on the Indian continental margin and geophysical studies of the tsunami generating areas off the Western Andaman.

- **Geodynamic Evolution of SW Indian margin**

The Laccadive ridge and surrounding basin in offshore area of SW Indian margin were taken up for studies on the continental rifting, sea floor spreading, imaging of basement and Moho across the SW Indian margin and offshore extension of land based tectonic elements.

- **Geological and structural characterization of Andaman -Nicobar Subduction Zone**

As a prelude to the post -Tsunami offshore data collection from the Andaman-Nicobar Subduction Zone, two contrasting geological milieu-the obduction related ophiolite and volcanic suite of rocks in the South Andaman Island and studies of the subduction related volcanic of the Barren-Narcondam Islands were launched. The petrography, mineral chemistry and geochemical studies have indicated formation of a hybrid magma by mixing of mafic and felsic magmas and existence of an enriched and depleted mantle beneath Narcondam and Barren Island respectively): (Dwijesh Ray, S. Rajan, **Rasik Ravindra** and Ashim Jana (2011, J. Earth Syst. Sci. 120, No1 and Dwijesh Ray, S. Rajan and **Rasik Ravindra** (2010) Current Science, Vol.99, No 8, 1021-1024).

- **Palaeoclimate studies from cores of Arabian sea**

Comparison of the proxies obtained from sediment cores from Arabian Sea were used to understand the monsoon driven changes in the western and eastern Arabian Sea and their impact on the deep sea ventilation during the past 21K years. (Gupta, K Mohan, Sarkar, Steven C. Clemens, **Rasik Ravindra** and Rajesh K. Uttam (2011): Palaeogeography Palaeoclimatology, palaeoecology, doi:10.1016/j.palaeo.2010.12.027.

- **IODP (Integrated Ocean Drilling Program).**

Since 2008, when India joined the IODP as an Associate Member, sustained efforts were made for making an Indian proposal to drill in the Arabian Sea by

utilizing Joides Resolution, capable of deep drilling in the ocean bottom. The compilation of geophysical records, sediment logs and other relevant data and its presentation to the IODP has resulted in obtaining the recommendation of the IODP Science Advisory Body for drilling in the Arabian Sea to address three major themes: The Deep Biosphere and the Sub seafloor Ocean; Environmental Change, Processes and Effects; and Solid Earth Cycles and Geodynamics

C. Oceanographic studies in Southern Ocean:

Fundamental research to understand the sensitivity of the Southern Ocean region to global climate by research on the dynamics of the formation & distribution of water masses, currents and sea ice, investigating the relationship between oceanic & atmospheric circulation systems, assessment of the distribution, sources and sinks of carbon, deciphering palaeoclimate records preserved in the sediment cores from the southern Ocean, was guided and supervised.

D. Installation and Commissioning of Strong Motion Accelerometers and Recorders at Andaman & Nicobar Islands.

Considering Andaman & Nicobar Islands are on the subduction zone and prone to earthquakes and prone Tsunamis, a national project to establish integrated GNSS receiver & accelerometer stations having VSAT connectivity has been taken up by INCOIS (Indian national Centre for Ocean Information Services). As Chairman of the Committee for installation and Commissioning of the systems, undersigned undertook Site inspections and oversaw the process that comprised of 35 numbers of GNSS receivers and Accelerometer with interface to VSAT for real time.

E. Polar Sciences and Cryosphere:

Undersigned participated in Indian Expedition to Antarctica in 1987-88 for the first time and subsequently led the Antarctic expedition in 1989-91. He visited the icy continent again in 1996-97, 2003-04, 2007 and 2009 in various capacities for specific assignments, contributing to different facets of Antarctic science, logistics and policy of this mission.

In 2010 he led the First Indian scientific expedition to South Pole that saw an eight member team of scientists on South Pole in record time opening new grounds for research by Indian scientists in the deep interior areas of Antarctica. He is also credited for selecting the site of the third Indian Station in Antarctica and for leading the First Indian Arctic Expedition that led to establishment of Bharati and Himadri in Antarctic and Arctic under his guidance.

He has led Indian delegations to ATCM, SCAR and COMNAP-the three main international bodies that govern the Policy, Science and Cooperation in Antarctica.

Educational Qualifications

Sl. No.	Courses Passed	University / Institute	Year of passing	Subject taken	Result with Division / Class
1	Intermediate (1 Yr Three year Degree Course)	J&K University.	1964	Geology, Math., Chem., Physics, English	First Division
2	B. Sc	-Do-	1966	Geology, Mathematics & Chemistry	First Division with Distinction
3	M. Tech.	University of Saugor, Sagar (MP), India	1969	Applied Geology	First Division with Distinction.

Employment records (in chronological order, starting with the first job)

Position , Name & address of Institution	From To		Nature of work and level of responsibilities
Research Scholar at University of Roorkee	July 1969	Nov. 1970	<ul style="list-style-type: none"> Study of Groundwater conditions in parts of U.P. province of India, Geochemistry and water table fluctuations.
Assistant Geohydrologist With Irrigation, Dept, Govt. of U.P. India.	Dec 1970	Dec 1971	<ul style="list-style-type: none"> Evaluation and development of ground water resources of the area lying between Ganga -Yamuna rivers of India
Geologist with Geological Survey of	Dec 1971	Jan 1980	<ul style="list-style-type: none"> Conducted regional geological mapping of more than 5000 sq km in Precambrian terrain of north-eastern Rajasthan.

India, Rajasthan			<ul style="list-style-type: none"> • Mineral investigations and new finds in Alwar district. • Team leader of the projects.
Geologist with Geological Survey of India, Bhutan.	Jan 1980	Jan 1983	<ul style="list-style-type: none"> • Participated in three expeditions to Higher Himalayas of Central Bhutan to map inaccessible areas for geological Appraisal, Graphite and chemical.. grade Limestone discovered. • Planning, execution of the two expeditions as Leader.
Senior Geologist. Airborne Mineral Survey & Exploration Wing, Shillong Geological Survey of India. (GSI)	Jan 1983	Oct 1987	<ul style="list-style-type: none"> • Ground verification of aeromagnetic anomalies in east Khasi Hill over hard rock areas of Meghalaya. • Investigations for Structural and Stratigraphic studies of middle to late Proterozoic rocks of Shillong Group of rocks.
Senior Geologist. Antarctica Division Faridabad. Haryana (GSI)	Oct. 1987	April 1997	<ul style="list-style-type: none"> • Conducted wide ranging studies on Environmental, Geological & glaciological aspects in the Eastern Antarctica. • Collaboration and Interaction with International communities. • Participated in 1987-88, 1989-91, 96-97 Indian expeditions to Antarctica. Led the 1989-91 expedition.
Director Wester Region, Jaipur, (G S I)	1997	1999	<ul style="list-style-type: none"> • Environmental Officer and Observer to XVI Indian Antarctic Expedition (1996-97) • Head of Office for Operations of GSI in Rajasthan, responsible for administration and financial Management. • Program formulation and implementation of field activities in Rajasthan. Scientific and technical supervision of Lignite and Industrial Minerals & rocks in Rajasthan
Director Mineral Exploration Training Centre Zawar (GSI)	1999	2000	<ul style="list-style-type: none"> • Organizing Training programs for middle to senior level administrative and scientific officers of state and Central government • Assisted faculty from MSM, The Netherlands, in assessing work areas of improvements of GSI..

<p>Director Antarctica Division, Faridabad (GSI)</p>	<p>Aug 2000</p>	<p>Jan 2005</p>	<ul style="list-style-type: none"> • Provided leadership from the Division to three Antarctic expeditions in five-year period (1999, 2003 & 2005), participation of scientists in international activities at Potsdam (Germany) and Milan (Italy). • Provided thrust to Earth Science programs in Antarctica by initiating new projects. • Nominated by D.O.D to lead the Task Force constituted for selection of suitable site for India's Third Antarctic Station.
<p>Deputy Director General Operations Punjab, Haryana & Chandigarh GSI</p>	<p>2005</p>	<p>2006</p>	<ul style="list-style-type: none"> • Scientific, technical and administrative supervision of all activities related to mineral, geotechnical aspects in states of Punjab, Haryana and Himachal Pradesh of India. • Equipping and modernization of geological and chemical laboratories at Faridabad and Chandigarh complexes of GSI Earthquake related studies, Capacity Building etc • Continued to take part in Committees constituted by Government for Antarctic Science and Logistics.
<p>Director NCAOR, Goa</p>	<p>Jan 2006</p>	<p>August 2012</p>	<ul style="list-style-type: none"> • Executive Head of the National Centre for Antarctica and Ocean Research, Goa, Ministry of Earth Sciences. Handling Budget of more than 100 Crore Rupees annually. • Planning and execution of scientific programs, Administration and financial management, running and maintenance of Indian Research Stations in Antarctica and Arctic, international cooperation with Antarctic nations, construction of New Antarctic station etc. • Initiation of new scientific projects, MOU with foreign nations . collaborations with Industry • Head of the Capacity Building Program for 48 nation agglomeration under SCAR In Charge of the SCAR student Fellowship program and Training Program of COMNAP • Supervised national programs such as Legal Continental shelf, Cobalt crust, Southern Ocean exploration, Integrated Ocean Drilling Program (IODP) and other offshore marine programs. • Initiated new programs such as GEOTRACES, hydrothermal Exploration, marine geological studies over Subduction Zone

TRAININGS

- Foundational Course in Administration by LBS National Academy of Administration,
- Management Training jointly by Administrative Staff College of India, Maastricht School of Management –The Netherland & the GSI Training Institute, Hyderabad.
- Management Training by National institute of Advance Studies, (NIAS) Bangalore
- Orientation Training at GSI Training Institute
- In House Training in Photo geology and Remote Sensing
- Advance Course in Administrative Studies with NIAS, Bangalore

MEMBERSHIP/ FELLOWSHIPS

- Member of the Editorial Board of *Indian Journal of Marine sciences*
- *Member of the Editorial Board of Journal of Coastal environment.*
- Life Member of the *North- eastern Hill Geographic Society*
- Fellow of the *Indian Geophysical Union*
- Fellow of the Indian Geological Congress
- Fellow of the Geological Society of India
- Member of the Society of Earth Scientists of India
- Fellow of the NIAS

POSITIONS IN THE SCIENTIFIC BODIES

- Chairman of the National Committee on SCAR (*Scientific Committee on Antarctic Research*)
- Chairman of the National Chapter of IODP (*till August2012*)

- President of the *Society of Earth Scientists* of India
- Chairman of the DST Committee on Dynamics of Himalayan Glaciers (till Aug, 2012)
- Vice President of Indian Geophysical Union
- Council Member of the *Geological Society of India (2007-10)*
- Member, Research Advisory Council, *Wadia Institute of Himalayan Geology (till 2010)*
- Member, Research Advisory Council *Birbal Sahni Institute of Palaeobotany (BSIP)*
- Member Governing Council of *Indian National Centre for Ocean Information Services (INCOIS, till 2012)*.
- Member Secretary of Governing Council and Research Advisory Council of *NCAOR, till Aug 2012*

INTERNATIONAL POSITIONS

- Vice Chair and Executive Committee Member of the *Committee of the Managers of National Antarctic Program, COMNAP (2008-10)*
- Vice President and Director in the Board of Trustees of SCAR (Scientific Committee on Antarctic Research during 2008- 12 term)
- Chair of the AFoPS (Asian Forum for Polar Sciences, till 2012)
- Chair of the Larsemann Group ASMA nations (Australia, China, Romania, Russia & India for the term 2010-12)
- Member of the IODP (International Ocean Drilling Program till 2012)
- Steering Committee Member of DROMLAND (Dronning Maud land Air Operator Network, 2006-2012)
- Steering Committee Member International Partnership in Ice core Drilling (IPPICS) for the term 2008-12.
- Member of the Award Selection Committee of Martha T. Muse Award (US\$ 100,000) for 2008-10.
- Vice Chair of the XXIX ATCM,(**Antarctic Treaty Consultative Meeting**) Edinburgh UK and Head of the Indian Delegation 2006.

- Head of the Indian Delegation at XXX ATCM, 2007, New Delhi, India
- Head of the Indian Delegation at XXXI ATCM- 2008, Kyiv Ukraine
- Head of the Indian Delegation at XXXII ATCM-2009, Baltimore,
- Head of Indian Delegation to XXXIII ATCM at Punta Del Este, Uruguay.
- Head of Indian Delegation to XXXIV ATCM at Buenos Aires, Argentina
- Head of Indian Delegation to XXXV ATCM at Hobart, Australia.
- Head of the Indian Delegation to Committee on Environmental Protection of Antarctica, COMNAP and SCAR Meetings between 2006 and 2012.

AWARDS / HONOURS

- National Award for Polar Sciences and Cryosphere-2013
- Recipient of National Mineral Award 1990, for contributions to National Antarctic expeditions.
- Recipient of Antarctica Award from Govt. of India, in 2002
- Recipient of H.N. Siddiquie Memorial Award Lecture (Gold Medal)
- Felicitations from H'ble Minister (Ministry of Science and Technology, Ocean Development and Human Resource Development)
- Appreciation from Secretary to Govt. of India, DOD, for contributions to Environmental tasks in Antarctica
- Delivered 37th Birbal Sahni Memorial Lecture (BSIP), Lucknow in 2007, Prem Bihari Memorial Lecture at IGC, Chandigarh, Foundation Day Lecture of Goa University
- Faculty for Academic Staff College, Goa University
- Nominated in Quality Assurance scheme of University of Goa
- Recognized as a Research Guide for Ph.D. by S.V. Patil University of Pune.
- Recognized among 100 prominent people worldwide committed to saving the Poles
- Panikkar Professorship by Ministry of Earth Sciences

PUBLICATIONS

1. **Rasik Ravindra**, 2013. Evolution of Rocky Oases in eastern Antarctica: Studies by Indian Scientists . IN. Ramesh, R., Sudhakar, M., Chattopadhyay, S., (eds.), Scientific and Geopolitical Interests in Arctic and Antarctic, *Proceedings of International Conference on Science and Geopolitics of Arctic and Antarctic, (iSaGAA)*, Pages 296. LIGHTS, Research Foundation, New Delhi.
2. Jonathan P Huang, Asit K Swain, Robert W Thacker, Rasik Ravindra, Dale T Andersen, Asim K Bej: 2013. Bacterial diversity of the rock-water interface in an East Antarctic fresh water ecosystem, lake Tawani(P). *Aquatic Biosystem* () :4
3. Abhijit Mazumder, Pawan Govil, **Rasik Ravindra** and Nelay Khare. 2013. Indication of colder conditions within Holocene period in a freshwater lake in Vestfold Hills area, east Antarctica region. *Geosciences Journal*. DOI 10.1007/s12303-013-0015-1
4. Abhijit Mazumder, Pawan Govil, Amit Kumar Ghosh and **Rasik Ravindra**. 2012. Significant Research on Diatoms in Antarctic Lakes during last decade. *J.Algal Biomass Utiln.* 3 (4): 74-79.
5. Gawas-Sakhalkar P., Singh S.M., Naik S., **Ravindra R.** 2012. High temperature optima phosphatases from cold-tolerant Arctic fungus, *Penicillium citrinum*, *Polar Research*.
6. Jonathan P. Huang, Nazia Mojib, Rakesh R. Goli, Samantha Watkins, Ken B. Waites, **Rasik Ravindra**, Dale T. Andersen, and Asim K. Bej. (2012) Antimicrobial activity of PVP from an Antarctic bacterium, *Janthinobacterium* sp. Ant5-2, on multi-drug and methicillin resistant *Staphylococcus aureus*. **Natural Prod. Bioprospect.** .DOI 101007/s13659-012-002-4.
7. Rasik Ravindra and C.M.Lalraj (2012): Cryosphere Research: Indian Perspective. Proc. Indian Natn. Acad. **78**, No 3, September, pp249-.257
8. **Rasik Ravindra** (2012): Preserving Perishing Paradises. *Geography and You*. Volume 12, issue 72, pp 06-11.
9. Pawan Govil, Rajesh Asthana, Abhijit Mazumder and **Rasik Ravindra** 2012. Grain Size Distribution and its Influence on Biological Productivity during Holocene in a Fresh Water Lake in Larsemann Hills, Antarctica. **National Academy Science Letters**. DOI 10.1007/s40009-012-0
10. Singh S.M., Ochyra R., Pednekar S., Asthana R. and **Ravindra R.** 2012. A Holocene moss species preserved in lake sediment core and the present moss diversity at Schirmacher Oasis, Antarctica. *Antarctic Science*, doi: 10.1017/S0954102012000211.
11. Singh S.M. & **Ravindra R.** 2012. Impact of climate change on Lichen & Moss communities in Ny-Ålesund, Arctic: some preliminary observations In: R. Sinha and R. Ravindra, "Earth System Processes and Disaster management", Springer.

12. Singh S.M., Sharma J., Gawas-Sakhalkar P., Upadhyay A.K., Naik S., Bande D., **Ravindra R.** 2012. Chemical and bacteriological analysis of soil from the middle and late Weichselian from Western Spitsbergen, Arctic, *Quaternary International*, doi:10.1016. 03.008.
13. Singh S.M., Sharma J., Gawas P., Upadhyay A.K., Pedneker S.M, **Ravindra R.** 2012. Atmospheric deposition studies of heavy metals in Arctic by comparative analysis of lichens and cryoconite. *Environmental Monitoring and Assessment*, doi:10.1007/ s10661-012-2638-5.
14. Singh S.M., Singh S.K., Yadav L., Singh P.N. & **Ravindra R.** 2012. Filamentous Soil Fungi from Ny-Ålesund, Spitsbergen, and Screening for Extracellular Enzymes. *ARCTIC*, 65:35-55.
15. Thamban M., Sushant S. Naik, C.M. Laluraj, Arun Chaturvedi, and **Rasik Ravindra.** 2012. Antarctic Climate Variability During the Past Few Centuries Based on Ice Core Records from Coastal Dronning Maud Land and Its Implications on the Recent Warming. **Earth System Processes and Disaster Management** (Chapter 5), **R. Sinha and R. Ravindra** (Eds) Society of Earth Scientists Series 1, DOI 10.1007/978-3-642-28845-6_5, Springer-Verlag Berlin Heidelberg 2012.
16. Anil K. Gupta, K Mohan, Sudipta Sarkar, Steven C. Clemens, **Rasik Ravindra** and Rajesh K. Uttam (2011): East-West similarities and differences in the surface and deep northern Arabian Sea records during the past 21 K years. *Palaeogeography Palaeoclimatology, palaeoecology*, doi:10.1016 /j.palaeo. 2010.12.027
17. Variability of *Nonionellina labradorica* Dawson in Surface Sediments from Kongsfjorden, West Spitsbergen, Suhas Shetye, Rahul Mohan, Sunil Kumar Shukla, Sudhakar Maruthadu and **Rasik Ravindra** (June 2011), *Acta Geologica Sinica*. Vol.85(3) 549-558. [IF 1.12]
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19. **Singh S.M.,** Singh P. & **Ravindra R.** (2011). Screening of Antioxidant Potential from Arctic Lichens. *Polar Biology*, DOI 10.1007/s00300-011-1027-9.
20. **Rasik Ravindra** and Anoop Tiwari (2011): India's interest in the Arctic and Antarctica. *Pentagon's South Asia Defence & Strategic Year Book 2011* (Ed.) Col Harjeet Singh (Retd.) Pentagon Security international, New Delhi, pp 95-101.
21. **Rasik Ravindra** (2011): India in Arctic and Antarctic and its Geopolitical significance. *Proceedings, National Conf. on Sc. And Geopolitics of Arctic and Antarctic*, 14-15 Jan, New Delhi .
22. Amit Dharwadkar, **Rasik Ravindra**, D. Jayapaul, S. Jayaram, PR Golani and V Ravikant (2010): On the Glaciological studies carried out in XXIII Indian Antarctic Expedition. (Tech Pub No 21)

23. Dwijesh Ray, S. Rajan, **Rasik Ravindra** and Ashim Jana (2011): Micotextural and mineral chemical analyses of andesite-dacite from Barren and Narcondam islands: Evidence for magma mixing and petrological implications, *J. Earth Syst. Sci.* 120, No1.
24. Dwijesh Ray, S. Rajan and **Rasik Ravindra** (2010): Mineralogy of the disseminated sulphides from the volcanic of South Andaman, *Current Science*, Vol.99, No 8, 1021-1024
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26. Dhruv Sen Singh, Vikram Bhardwaj, Amit Awasthi, **R. Ravindra** (2010). Hydrogeochemistry of MidreLoven and Vestr Brogger glacial fed streams, Ny Alesund, Arctic. **Under Review** in *Environmental earth Sciences*.
27. **Rasik Ravindra** (2010): The Indian Expedition to Arctic. Proceedings W/Shop, Arctic Ecosystem and its Implications for India (Ed) S. Z. Qasim & Kishore Kumar, COES, New Delhi.
28. Singh, D.S. and **Rasik Ravindra (2010)**. Geomorphology of the Midre Loven Glacier, Ny Alesund, Svalbard, Arctic. In Book : Quaternary geological Processes: natural Hazard and climate Change by Macmillan Publisher Ind. Ltd. pp 269-280.
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33. **Rasik Ravindra** (2008) Antarctic Earth Science-Indian Effort. Golden Jubilee Volume, Geological Society of India, pp 521-538.
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44. **Ravindra, R.** and Pandit, M.K. (2000): Geochemistry and Geochronology of A-Type Granite from Northern Humboldt Mountain, East Antarctica: Vestige of Pan-African Event. *Jour. Geol. Soc. Ind., Vol. 56, No. 3, pp.253-262.*
45. **Ravindra, R.** (2000): Report of the Environmental Task Force. *Scientific Report of Sixteenth Indian Expedition to Antarctica, Tech. Pub. No. 14, D.O.D., Govt. of India, New Delhi, pp. 429-440.*
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