Collection of relevant scientific data

Executive Summary

The Republic of Korea's report outlines, "*inter alia*: actions undertaken to address the effects of climate change on the oceans, in particular, with regard to (i) collection of relevant scientific data," in response to the request of the Office of Legal Affairs of the United Nations detailed in its note of 16 December 2016, LOS/SGR/2017. The Report consists of data collected from two sources: 1) **The NIFS (National Institute of Fisheries Science)** and 2) **KHOA (Korea Hydrographic and Oceanographic Agency)**

The NIFS has carried out Korea Serial oceanography Observations (KSO), which measured temperature, salinity, and biochemical factors, to understand the impact of climate change in Korean waters and analyze the oceanic conditions around the Korean Peninsula six times a year since 1961. The observations measured the temperature, salinity, dissolved oxygen, zoo- and -phyto-plankton, nutrient, and oceanic meteorological factors, among others, in the East Asian Marginal Seas. The data collected from KSO is officially used to clarify the impact of climate change on Korean waters.

The broad findings indicated an increase in sea surface water temperature of roughly1.11°C during a 48-year period of 1968-2015. This is 2.5 times higher than the global increase in mean sea surface temperature, which is about 0.43℃, during the same 48-year period. The increase is believed to be mostly due to the marine features of the semi-closed ocean area, long-term changes to the Siberian High and Pacific Decadal Oscillation (PDO), and the effect of Tsushima Warm Current. On the other hand, salinity decreased slightly over the same period by 0.29 psu, attributed to the effects of changes in Changjian Diluted Water.

The KHOA has been operating a real-time Korea Ocean Observing Network (KOON) which consists of 50 Tidal Stations, 3 Ocean Stations, 30 Ocean Buoys, 40 Surface Currents Stations and 3 Ocean Research Stations. KHOA analyzed the long-term tide gauge records over a 40-year period (1975-2015) from 18 tidal stations on Korea's coasts. The average rates of Mean Sea Level (MSL) rise are 1.31 mm/yr on the west coast of Korea, 2.89 mm/yr in the south and 2.69 mm/yr in the east.

Report

1. NIFS (National Institute of Fisheries Science)

Since 1961, NIFS (National Institute of Fisheries Science) has carried out the Korea Serial oceanography Observation (KSO) using the Research Vessels (RVs). This consists of 25 lines and 207 stations in Korean waters. The observations have usually been carried out six times a year and measured temperature, salinity, dissolved oxygen, zoo- and -phyto- plankton, nutrient, oceanic meteorological factors and so on. The observations aim to provide information about fishing ground conditions around the Korean Peninsula and accumulate scientific data related to climate change in the East Asian Marginal Seas. The results of KSO are officially used to analyze the impact of climate change on Korean waters. The long-term trend of sea surface temperatures in Korean waters showed an increase of 1.11℃ during the last 48 years from 1968 to 2015. This is 2.5 times higher than the increase in global mean sea surface temperatures, which is approximately 0.43℃, during the same 48-year period. The reasons for the higher increase in the surface temperature of Korea waters are believed mostly to be the marine features of the semi-closed ocean area, effects of long-term changes of Siberian High and Pacific Decadal Oscillation (PDO), and the effect of the Tsushima Warm Current. On the other hand, salinity slightly decreased by 0.29 psu during the last 48 years from 1968 to 2015. It is estimated that the reason for the trend towards decreasing sea surface salinity in Korean waters is the effect of changes in the Changjian Diluted Water.

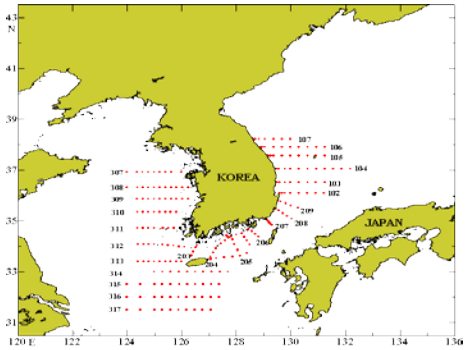

Fig. The location of KSO by NIFS

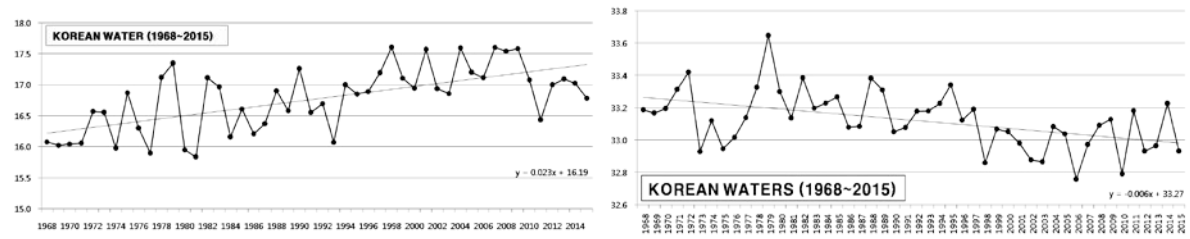

Fig. Long-term variation of sea surface temperature and salinity from 1968 to 2015 in the Korean waters

Reference

NIFS (2016): Research on impact of climate change and vulnerability assessment in fisheries. *Annual Report of NIFS*. National Institute of Fisheries Science. pp. 24.

2. KHOA (Korea Hydrographic and Oceanographic Agency)

The Korea Hydrographic and Oceanographic Agency (KHOA) operates the real-time Korea Ocean Observing Network (KOON) that consists of 50 Tidal Stations, 3 Ocean Stations, 30 Ocean Buoys, 40 Surface Currents Stations and 3 Ocean Research Stations (Fig. 1). The KOON provides real-time ocean information through a data quality process in order to meet the needs of researchers, the oceanic industry, the military and the public.

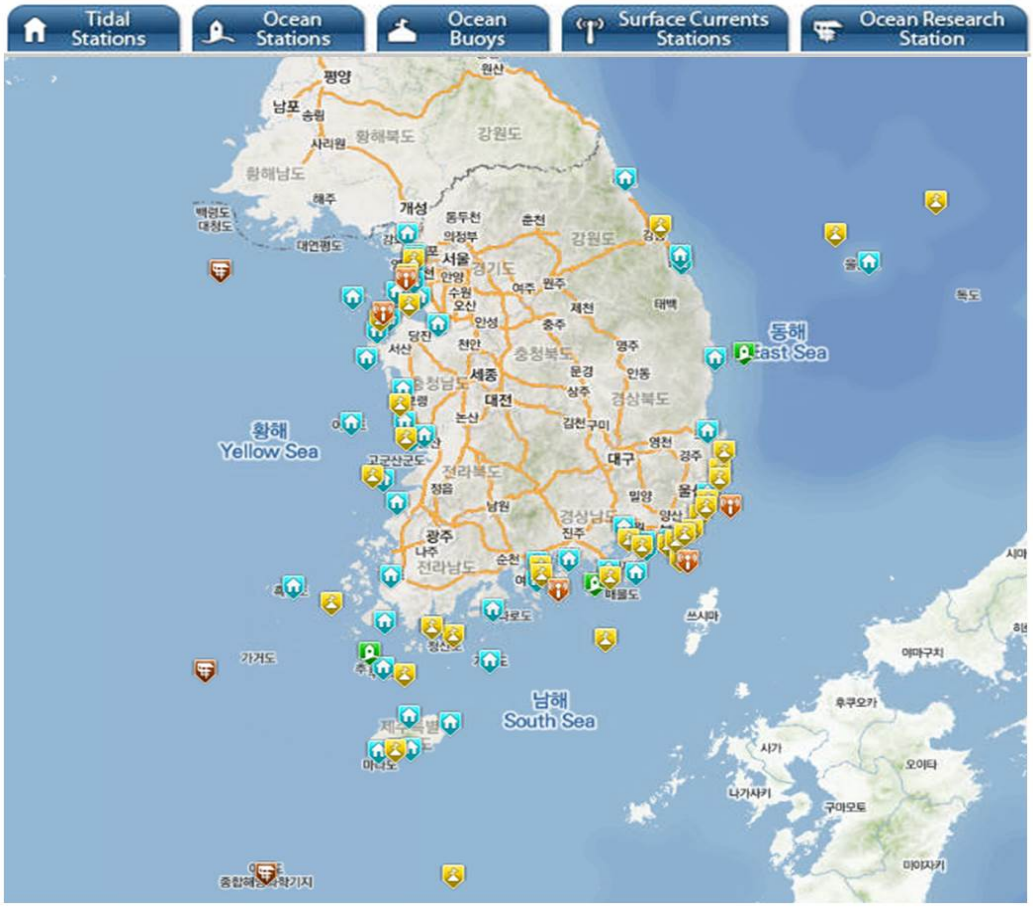

Fig. 1.The Korea Ocean Observing Network (KOON) operated by the KHOA.

As the first ocean observatory generation in Korea, a total of 50 Tidal Stations are located on the shores of major ports and islands, and mainly sea level data is obtained (Figs. 1 and 2). The KHOA has analyzed the long-term tide gauge records for 40 years (1975~2015) from 18 Tidal Stations on the Korean coasts. According to the time-series analysis results of tide gauge records, the average rates of Mean Sea Level (MSL) rise are 1.31 mm/yr in the west coast of Korea, 2.89 mm/yr in the south, 2.69 mm/yr in the east (KHOA, 2015) (Figs. 3 and 4).

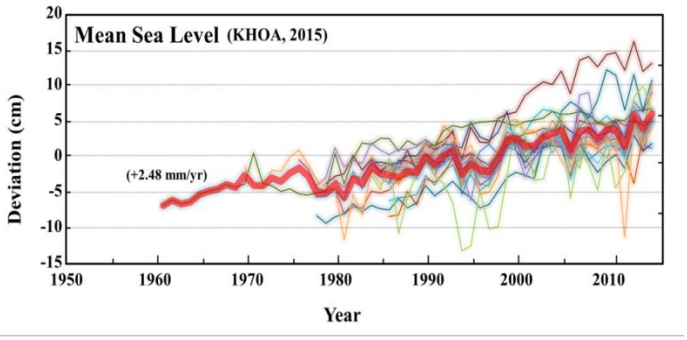

Fig. 2. Tidal Station (Busan) operated by the KHOA. Fig. 3. Mean Sea-level (MSL) trends at the Korea coasts.

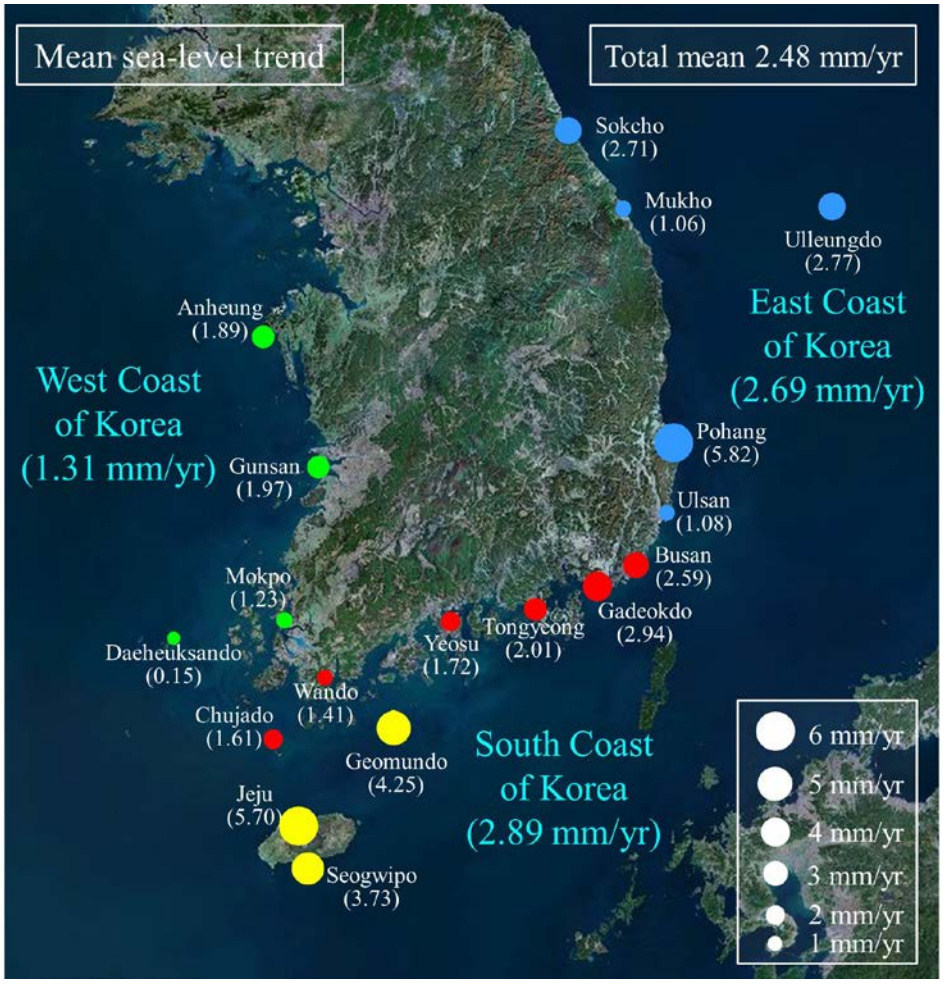

Fig. 4. Mean Sea-level trends at 18 tidal stations.

3 Ocean Stations are fixed offshore facilities (Figs. 1 and 5). Offshore wave data are mainly provided. 30 Ocean Buoys (anchored) consist of ocean observation sensors, telecommunication equipment, power, etc. The buoys are installed offshore where the stations couldn't be built (Figs. 1 and 6). High Frequency (HF) radar systems measure the speed and direction of surface currents in real-time at 40 Surface Current Stations (Figs. 1 and 7).

Fig. 5. Ocean Station (Wangdolcho).

Fig. 6. Ocean Buoy (Haeundae).

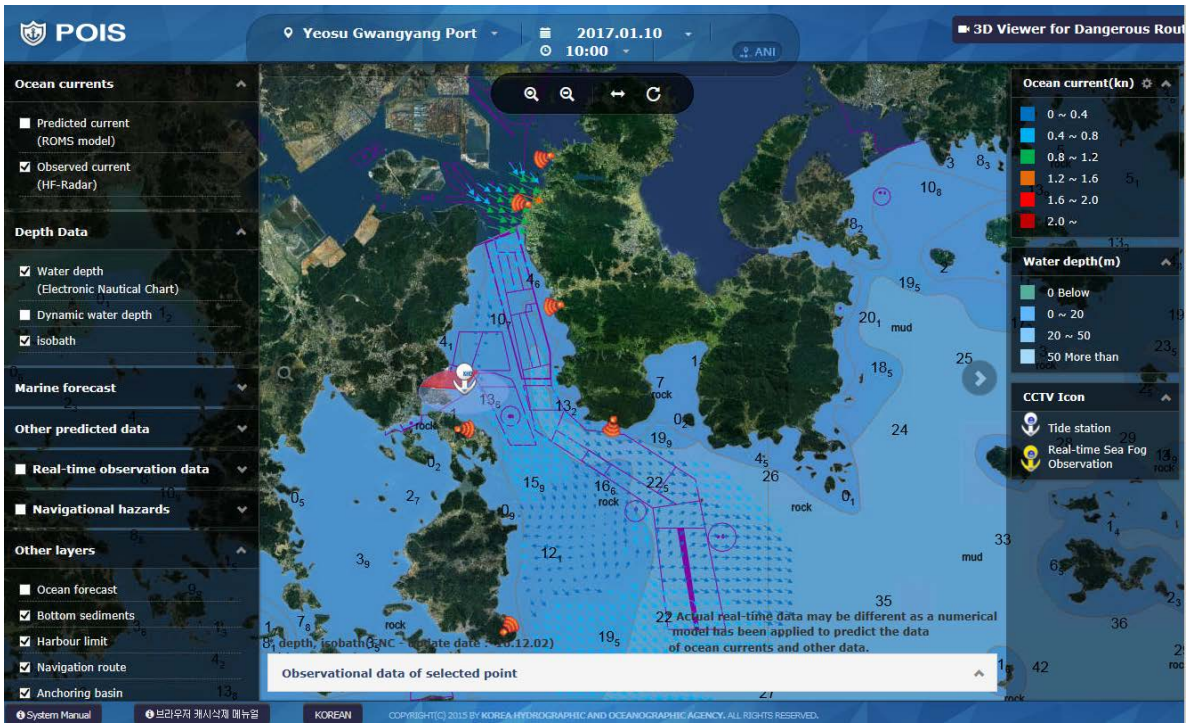

Fig. 7.Six Surface Current Stations (HF-Radar) at Yeosu-Gwangyang Port.

The KHOA has been operating three Ocean Research Stations (ORSs). The Ieodo, ShinanGageocho and OngjinSocheongcho Ocean Research Stations were constructed in 2003, 2009 and 2014, respectively (Fig. 8). They are used to conduct oceanographic, meteorological and environmental observations. The Ieodo ORS has 29 types of instruments composed of 38 pieces. The ShinanGageocho has 11 types of instruments composed of 15 pieces. The OngjinSocheongco has 17 types of instruments composed of 35 pieces instruments. Observed data from ORSs are provided in real-time via the Korea Real-time Database for NEAR-GOOS

(http://www.khoa.go.kr/koofs/eng/observation/obs_real.do). .

Figs. 8. Three Ocean Research Stations (ORSs)

References

KHOA (2015), Analysis and Prediction of Sea Level Change. KHOA report.