

Comparison of long-term SST around the Korea using the datasets from JOISS, Korean ocean data repository

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Introduction

In its fourth report (2007), the IPCC (United Nations Intergovernmental Climate Council) announced that climate change, represented by global warming, is in progress, and as evidence of the progress of climate change, rises in temperature and water temperature, and sea level rise were presented. On the other hand, as a feature of the global change pattern, there are local variations in the rate of change, so in the case of an increase in water temperature and a rise in sea level, the western Pacific Ocean, including Korea's sea area, appears to be a sea area higher than the global average. It is fundamental to forecast these long-term changes in the formulation of policies to respond to maritime change.

Kang (2000) analyzed the sea surface temperature data from 1936 to 1995 measured at 18 observation points located on the coast of Korea to obtain the trend of linear changes in sea surface temperature. As a result, it was argued that the annual average sea surface temperature increased at an average rate of 0.024 degrees/year for the last 30 years from 1966 to 1995, which was more than twice the increase rate of the annual average sea surface temperature for 60 years from 1936 to 1995.

In this study, the results of the existing study on the rising sea level temperature in Korea have been expanded by adding data that has been observed until recently, and the content compared with the trend of rising surface water temperature abroad is produced as a content and then posted on the JOISS website.

Materials and Method

• Study area

- Korea is surrounded by water on three sides. The East Sea is the deepest sea among the seas on the three sides, and the North Korean Wave descending from the north and the East Korean Warm Current rising from the south meet, and the West Sea has developed tidal flats. The South Sea has a Rias-style coast, and turbulence flows throughout the year.
- Sea surface temperature changes in the range of 120-140E, 30-50N corresponding to WMO Squares (1312, 1313, 1412, 1413) among the waters under the jurisdiction of Korea were compared.

• Materials and Method

- The domestic data used in the study was JOISS portal's Serial Oceanographic Data Center (KODC), which collects and provides research data observed in the waters of the Korean Peninsula and open data from domestic and foreign institutions, and NOAA's ERSSTv5 data were used for overseas data.
- Serial Oceanographic observation data (KODC) data are marine scientific data produced by regularly and systematically observing the East Sea, West Sea, and South Sea of the Korean Peninsula. From 1961 to the present, it is surveyed six times a year, and 17 items such as water temperature and salinity in the water layer are investigated. However, data from 1968 onwards were used because sea surface temperature anomaly data has been provided since 1968.
- The ERSSTv5 (NOAA) data is global data, and it is providing to spatial range and temporal range wider than the spatial range of the surface water temperature observed in Korea. It has been observed from 1854 to the present day, Spatial resolution is 2° and sea surface temperature anomaly(SSTA) value is also provided.
- Linear regression analysis was used for the analysis of the SSTA trend line, and the recursive division method was used for regime shift analysis.

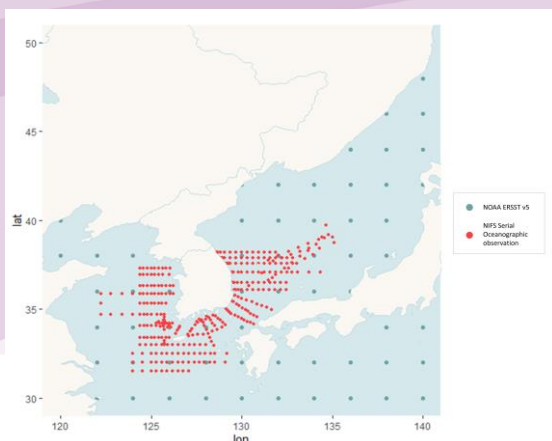


Figure 1. NOAA ERSSTv5 & NIFS Serial Oceanographic observation station

Results and Discussion

- Time series graphs and regime shift analysis of SSTA were conducted to examine the long-term fluctuation trend of the water temperature deviation in the offshore and offshore Korean peninsula.
- The SSTA time series graph shows that the SSTA value of the Serial Oceanographic observation (KODC) data is positive since the early 1990s, and the SSTA value of the ERSSTv5 (NOAA) data is negative in the early 1990s and positive since the late 1980s.
- Serial Oceanographic observation (KODC) data and ERSSTv5 (NOAA) data showed that the slope of the increase rate of SSTA value was 0.025 and 0.021, respectively, showing similar trends in both the offshore and the open sea.

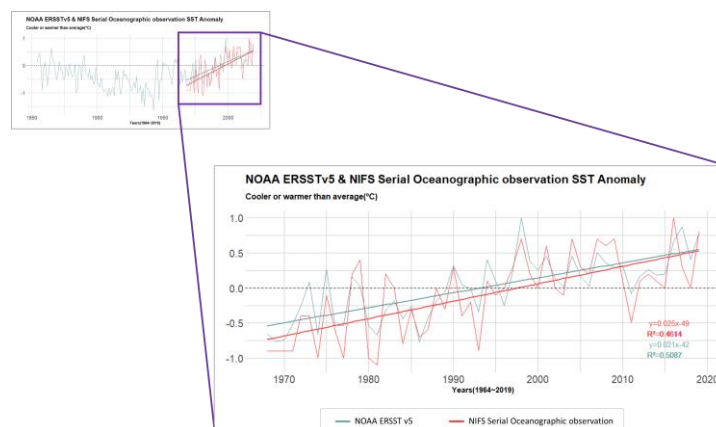


Figure 2. NOAA ERSSTv5 & NIFS Serial Oceanographic observation SST anomaly(1968-2019)

- The regime shift analysis of the Serial Oceanographic Observation (KODC) and ERSSTv5 (NOAA) SSTA data to understand exact water temperature fluctuations showed significant increases in SSTA value from the late 1980s to the early 1990s.

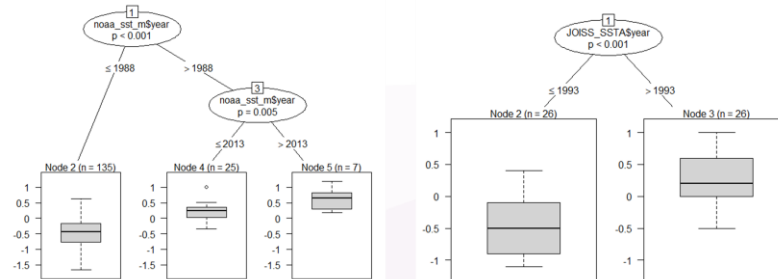


Figure 3. ERSSTv5 & NIFS Serial Oceanographic observation SST anomaly regime shift analysis results

- Using serial oceanographic observation (KODC) and ERSSTv5 (NOAA) data, an SSTA time series and regime shift analysis in the coastal water and open sea of the Korean peninsula showed that the rise in water temperature began in the late 1980s and continues to this day. Therefore, it is necessary to take measures against warming based on continuous observations and predictions.
- JOISS (<http://joiss.kr>) is a platform that collects and provides marine data produced in Korea, and provides marine data analysis tutorials and literacy. Using the data of the JOISS platform, you can continuously check the water temperature fluctuations in the sea area of Korea, and you can also check the content of analysis contents related to sea surface temperature and heat content.

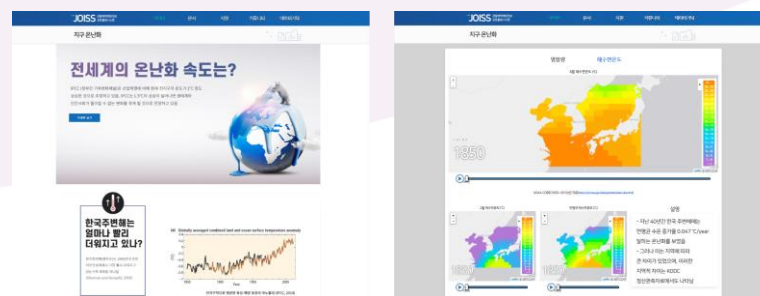


Figure 4. JOISS(<http://joiss.kr>) global warming contents page

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