

Sea level change around Korean Peninsula over the last several decades based on observation data and numerical model

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This Study was intended to investigate mean sea level (MSL) rise trend in the Korea coast and the Northwest Pacific. For this study, we analyzed the 21 tide-gauge records collected by Korea Hydrographic and Oceanographic Agency (KHOA), satellite altimeter data by TOPEX/POSEIDON, and results of Regional Climate Ocean Model (RCOM) for last several decades.

According to the time-series analysis results of the tide-gauge records, the average rates of MSL rise are 3.19 mm/yr in the south coast of Korea, 3.05 mm/yr in the east, and 2.00 mm/yr in the west, with an average rate of 2.90 mm/yr during 1989~2017. From the satellite altimeter data collected within 50 km from tide-gauge stations around Korean Peninsula, the aliasing effects were corrected and used to estimate the long-term (1993~2017) sea level trend. The sea level trend of merged data with tide-gauge data and altimeter data has risen 3.40 mm/yr, 3.71 mm/yr, 2.75 mm/yr, and 3.88 mm/yr for the whole areas of the East Sea, the Yellow Sea, the East China Sea, and the Kuroshio Extension, respectively.

The RCOM with high resolution of 1/20° horizontally and 40 layers vertically has been established for reproduction and long term forecast of sea-level rise in the Northwest Pacific, including marginal seas around Korea. Dynamic downscaling processes using result of the global climate model were applied to the open boundary conditions of our RCOM. To investigate model results according to open boundary conditions, experiments using 1) SODA reanalysis data (Control Run, CR), 2) SODA reanalysis data and reconstructed SSH (Evaluation Run, ER), and 3) NorESM1-M global model (Historical Run, HR) as boundary condition were performed. As a result of the RCOM, sea level trend of reconstructed data around Korean Peninsula is estimated to 3.54 mm/yr. The trend of CR, ER, and HR were 2.59 mm/yr, 3.66 mm/yr, 3.13 mm/yr for 1980~2005, respectively

These results revealed that rising rate of sea level in the Korea coast and Northwest Pacific is higher than global rate of about 2.0 mm/yr during 1971~2010, but almost similar to the global rate of 3.2 mm/yr during 1993~2010 (IPCC, 2013). Future studies will focus on predicting the next 100 years of sea level change based on IPCC climate change scenario (RCP2.6, 4.5, 8.5).