

Constructing an ocean data assimilation product using satellite sea surface temperature

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The Japan Aerospace Exploration Agency (JAXA) operates the several earth observation satellites, and provides satellite sea surface temperature (SST) data. Satellite capability to detect SST data is advancing in recent year. For example, the Himawari-8 which was launched in 2014 is able to detect SST around Japan every 10 minutes. However, a satellite SST dataset includes some missing depending on the type of satellite and sensor, and doesn't provide the vertical ocean data. In this study, we construct a temporally and spatially uniform ocean dataset, using a data assimilation method which combines the satellite SST data and the ocean model data.

Our target area is south of Japan where the Kuroshio flows. The data assimilation technique and ocean model which we use are the Local Ensemble Transform Kalman Filter (LETKF) and the Stony Brook Parallel Ocean Model (sbPOM). The LETKF is able to represent small scale variations effectively. We assimilated the observation data including in two satellite SST data sets (Himawari-8 and GCOM-W/AMSR2) provided by JAXA. The Himawari-8 data allow spatio-temporally high resolution but could include cloud noise. On the other hand, GCOM-W/AMSR2 provides relatively coarse resolution cloud-free data.

In attached figures, we show the satellite and analysis SST distributions and the vertical temperature distributions represented by analysis data along 139E, from November 22 to November 25, 2016. A cyclone passed south of Japan from November 23 to 24, and it snowed around Tokyo with cool air coming southward. The analysis data reproduce the observed SST drop caused by the weather disturbances and reasonably estimate the SST states in the cloudy area and nearshore region missed by the satellite observation. Also, subsurface isotherms became sparse along 139E, suggesting the mixed layer deepening induced by the cyclone.

We are constructing a web site to operationally provide the information for fishery applications. The contents include 'analysis data', 'forecast data', 'satellite SST', 'sea levels on observation sites', and 'time series at mooring sites off Kochi'. We are updating the information on the website every week.

In the presentation, we will discuss usability of the satellite SST data for data assimilation in detail.

Keywords: Himawari-8, AMSR2, ocean data assimilation, LETKF, sea surface temperature

