

Evaluation of sea level of the Java Sea using satellite altimeter and an oceanic general circulation model

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The climatological sea level of the Java Sea and the Makassar Strait are reproduced using HYbrid Coordinate Ocean Model (HYCOM) setting up in the horizontal grid from 105°E to 120°E and from 9°S to 3°N. The model is initialized by the oceanic temperature and salinity from Levitus 1994 and forced by the atmospheric field derived from COADS reanalysis. In this research HYCOM is applied to explain the physical mechanism of interactions among wind speed, SST (sea surface temperature), and sea level anomaly. Two climatologies of sea level data are reproduced to validate HYCOM outputs. The climatological tide gauge sea level is produced based on hourly sea level data from 1991 to 1999. TOPEX/Poseidon (T/P) climatology is based on T/P along track from 1993 to 1999. The correlation between tide gauge sea level and HYCOM SSH (sea surface height) is 0.79, 0.84, 0.59, and 0.87 at Jakarta, Jepara, Surabaya and Makassar respectively. The HYCOM results show the sea level in the northern part of the Java Island during the northwest monsoon is lower than the ones in the southeast monsoon. Easterly wind expels the low salinity water of the shallow Java Sea into the surface layer of the Makassar Strait by the northwest monsoon-induced surface current, and caused the higher sea level towards the Makassar Strait. The sea level in the Makassar Strait is higher than the one in the Java Sea about 100 mm. On the contrary, the southeast monsoon-induced current caused the sea level of the Java Sea 100 mm higher than the ones in the Makassar Strait. However, comparison between T/P SLA (sea level anomaly) and HYCOM SSH show T/P SLA are 200 mm higher, and 200 mm lower than HYCOM SSH in the Karimata Strait during the northwest and southeast monsoons respectively. These indicate impacts of the monsoon-induced surface current on the sea level are not as high as the HYCOM estimations.