The 36th International Symposium on Remote Sensing of Environment,
11 – 15 May 2015, Berlin, Germany, ISRSE36-293

Quantifying variability of the surface currents in the Norwegian Sea: Estimation based on different gravity models and mean sea surface datasets

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THEME: MARI

KEY WORDS: Atlantic Water, Mean dynamic topography, volume transport, Absolute dynamic topography

ABSTRACT:

The pole-ward transport of warm Atlantic Water is a key component in maintaining a relatively mild climate in the northwestern Europe. In order to study the variability of the surface circulation of the Norwegian Sea, a new mean dynamic topography (MDT) is estimated from the latest release of GOCE gravity model and the CNES-CLS12 state-of-the-art mean sea surface (MSS), with time reference to 1993-2012. Taylor diagrams are used to compare this new MDT with other MDTs estimated from the previous releases of GOCE and GRACE gravity data, and other MSS datasets with different time integration period (i. DTU10 MSS, time reference: 1993-2009, ii. CNES-CLS11 MSS, time reference: 1993-1999). For each MDT dataset, the absolute dynamic topography (ADT) is estimated from the MDT and sea level anomalies referenced to their respective MSS time-period. The variability in the strength and direction of the surface currents derived from the ADTs are quantified. Volume transports estimated for seven different sections from altimeter derived surface velocities and hydrographic datasets are inter-compared and evaluated against independent observations. The study documents the improvement in the retrieval of the surface currents and volume transports in the Norwegian Sea from the latest release of the GOCE gravity data.

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