Monitoring the Ocean State from the Observations

Stéphanie Guinehut, Sandrine Mulet, Anne-Lise Dhomps, Marie-Hélène Rio and Gilles Larnicol
CLS, Ramonville, France

Producing comprehensive information about the ocean has become a top priority to monitor and predict the ocean and climate change. Complementary to modeling/assimilation approaches, an observation based approach is proposed here. It relies on the combination of in-situ (temperature and salinity profiles) and remote-sensing observations (altimetry and sea surface temperature) and statistical methods. Global temperature, salinity, absolute height and currents fields are provided at a weekly period from the surface down to 1500-meter depth and for the 1993-2009 periods.

The method uses first, a multiple linear regression method to derive synthetic T/S profiles from the satellite measurements. These synthetic profiles are then combined with all available in-situ T/S profiles using an optimal interpolation method to create the ARMOR3D fields. The thermal wind equation with a reference level at the surface is finally used to combine current fields from satellite altimetry with the ARMOR3D field and thus to generate the global 3D current fields called SURCOUF3D.

This ocean state estimate based on observations only is first compared to independent gridded fields based on similar datasets but different methods (Scripps Argo Atlas), to model outputs (Mercator Glorys and SODA reanalysis) and to independent data sets (ANDRO, RAPID-WATCH current meters). The global ocean hydrographic variability patterns are then described over the 17 years periods. Finally, the Atlantic Meridional Overturning Circulation (AMOC) through the 25°N section is studied and compared to independent estimates.