Jean
Tournadre
IFREMER
Marjolaine Krug, FCSIR
Jordi Isern-Fontanet, IC3
Nicolas Reul, IFREMER
Bertrand Chapron, IFREMER
Oral
The water from the Altantic ocean flows near the surface through the Strait of Gilbraltar into the western Alboran Sea where the light Atlantic waters meet the dense Mediterranean ones. This meeting gives rise to intense density fronts and energetic meso-scale features such as two semi-permanent anticyclonic vortices known as the western and eastern Alborán gyres (WAG and EAG). This circulation is strongly variable in both time and space, with episodes where neither the western Alborán gyre nor the eastern Alborán gyre are present. We present a new approach to the analysis of the variability of the Alboran Sea circulation based on the combined analysis of different satellite data, i.e. SAR, Altimeter, Sea surface temperature and scatterometer. Firstly, about 1000 Synthetic Aperture Radar images over the Western Mediterranean sea have been analyzed in terms of surface currents (estimated from Doppler ship). The results have then been averaged to compute the mean surface current. The mean circulation is characterized by strong WAG with mean current speed of the order of 1 m/s and and weaker EAG with mean speed of the order of 50 cm/s. This mean circulation has been used to compute a high resolution mean dynamic topography, the necessary base for the estimate of absolute dynamic topography from altimeter data. The absolute dynamic topography for the three Topex/Jason1/Jason2 that overfly the Alboran Sea has been estimated to create an homogeneous series covering 20 years. Because of the narrowness of the Alboran sea , the number of conventional 1Hz altimeter data usable is limited (~25) and does not allow a good estimate of geostrophic speed. It is necessary to consider the high resolution 20Hz data to have a better estimate of the current speeds. Using Lee filter we estimate the geostrophic current from the absolute dynamic topography for the three altimeter passes that cover the alboran sea.This analysis based on Topex, Jason1 and Jason2 data shows the high spatial and temporal variability of the WAG and even an increase of the inflow of Atlantic water on pass 20 (the closet to the Gibraltar straight that need to be further confirmed and validated. The velocities are compared to the sea surface temperature variability as estimated from the NASA pathfinder data and to the short scale variability of scatterometer winds.
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