Geophysical Research Abstracts
Vol. 19, EGU2017-3628-1, 2017
EGU General Assembly 2017

Ekman currents and Mixed Layer depth in the North Atlantic subtropical gyre. Observations and Mercator analysis PSY2V4R2-R4.

Anna Sommer (1,2), Gilles Reverdin (1), Jacqueline Boutin (1), and Yann Drillet (3)

(1) UPMC/LOCEAN, Paris Cedex 05, France (anslod@locean-ipsl.upmc.fr), (2) LSCE, Saclay, Gif-sur-Yvette CEDEX, France, (3) Mercator Ocean, Ramonville-Saint-Agne, France

The study is focused on the ocean currents and was motivated by estimating the role of Ekman transport in seasonal salinity variability in the North Atlantic subtropical gyre region of maximum salinity (SSS-max region). Traditionally, one separates in the ‘low frequency currents’, geostrophic and Ekman components (stationary response to wind stress). The surface geostrophic part can be estimated from altimetry, and estimates of ‘residuals’ (’Ekman’) are available at 15m from drifts of drogued SVP drifters. However, direct estimates are usually not available at other depths, and there is an issue with its vertical structure, and how deep it extends. Thus, we also examined Mercator analysis PSYV4R2-R4 for the same period and region (August 2012-July 2014). We show the comparison of average Ekman currents in ML estimated by the widely used formula $\frac{\tau e^{i*90}}{\rho f h}$ (where h is MLD) and residual currents (difference between total current in ML and geostrophic current estimated from SSH) in Mercator analysis PSYV4R2-R4.

Residual Mercator current averaged in ML is larger than the Ekman current estimated by the formula, with RMS differences on the order of 0.02 m/s. Part of the difference can be due to the increments in Mercator data assimilation that we expect to be small at the weekly time scales that we consider. The differences can also result from Ekman transport penetrating below MLD (h). The issue might come from MLD not always coinciding with the Ekman Depth and in the weekly averaging. We also find a difference in the behavior of the Ekman currents at 15m between drifters and the Mercator analysis.

Such differences strongly modify how Ekman contributes to advection and salinity variability in the ML. For example, Ekman advection estimated from Mercator analysis for the period August 2012-December 2014 in this SSS-max region is -0.88 pss/yr compared to what we would deduce from observations and the formula $\frac{\tau e^{i*90}}{\rho f h}$, which is estimated as -0.17 pss/yr.