Geophysical Research Abstracts
Vol. 17, EGU2015-3500, 2015
EGU General Assembly 2015

Salinity variability in the North Atlantic through synergetic analysis of Argo floats and satellite altimetry data

Ilaria Stendardo (1), Monika Rhein (1), Birgit Klein (2), and Achim Roessler (1)

(1) Universität Bremen, Institude of Environmental Physics, Department of Oceanography, Bremen, Germany (ilaria.stendardo@uni-bremen.de), (2) Bundesamt für Seeschifffahrt und Hydrographie (BSH), Germany

Salinity distribution in the North Atlantic is affected by changes in the circulation and freshwater fluxes. Changes in salinity are introduced into the ocean's interior by vertical processes like subduction or convection, and transported along circulation pathways. At a given location and depth, salinity could vary by water mass changes due to changes in the freshwater flux, or by vertical migration of density surfaces caused either by wind-driven changes of ocean ventilation or by thermodynamic processes, like poleward migration of isopycnals as a result of surface warming. Changes in the wind driven circulation with a consequence shift of the subpolar front, that separates the fresher subpolar from the saline subtropical gyre, also have a marked influence on upper ocean salinity in the subpolar North Atlantic. Due to the lack of temporal and spatial resolution of salinity observations, salinity anomalies in the last century could only be studied by 5-year means. Thanks to the Argo program, the temporal and spatial resolution of salinity and temperature profiles since early 2000 have significantly improved, allowing to calculate even monthly means. To further improve temporal and spatial resolution of salinity, Argo profiles are combined with altimetry data and a "Transfer function", the Gravest Empirical Mode (GEM), is calculated. The GEM technique exploits the relationship between T/S profiles and dynamic height in order to parameterize salinity data as a function of dynamic height from the satellite altimetry. This technique gives the opportunity to extend the investigation of the salinity variability, with extremely high temporal (daily) and spatial (1/4°) resolution, back to 1993, the beginning of the altimetry data. This method was tested on several regions of the North Atlantic and it works particularly well for some of them, for example in the regions where the North Atlantic Current plays an important role. Within these regions salinity variability in the upper 700 m is analyzed.