Geophysical Research Abstracts
Vol. 19, EGU2017-17315, 2017
EGU General Assembly 2017

The AMOC as a mechanism for nutrient supply to the Eastern North Atlantic

Ryan Peabody and Susan Lozier

Duke University, Nicholas School of the Environment, Earth and Ocean Sciences, Durham, United States (ryan.peabody@duke.edu)

The supply of nutrients fueling primary production in the North Atlantic Ocean has traditionally been attributed to vertical processes, specifically to Ekman upwelling. In the horizontally divergent subpolar gyre, Ekman upwelling supplies the nutrients necessary for strong phytoplankton growth. Conversely, in the horizontally convergent subtropical gyre Ekman pumping inhibits this supply, and phytoplankton growth is low. This partitioning, however, does not apply to a wide swath of the North Atlantic situated between the subpolar and subtropical gyres, the intergyre region, where the surface flow is neither horizontally divergent or convergent, and, consequentially Ekman velocities are weak. The absence of Ekman-upwelling in this region is not accompanied by weak phytoplankton growth. On the contrary, primary production in the eastern intergyre region is similar to that seen in the subpolar gyre. Here, we show that nutrients driving primary production in the eastern intergyre region originate in the Gulf Stream and are horizontally transported from the subtropical gyre to the subpolar gyre via the upper limb of the Atlantic Meridional Overturning Circulation. The seasonal progression of phytoplankton growth in the intergyre region is explained in the context of this horizontal supply of nutrients.