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CGD Seminar Series

Pathways of the North Atlantic Deep Water in the North Atlantic Subtropics: Structure and Recirculation Dynamics

Tiago Bilo

Scripps Institution of Oceanography

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Time: 11am – 12pm

For Zoom information, please contact Tracy Baker tbaker@ucar.edu

For live stream information, visit the CGD Seminar Webpage

ABSTRACT

The structure and dynamical processes controlling the North Atlantic Deep Water (NADW) interior pathways and recirculation in the North Atlantic subtropics (15-50°N) are investigated using different observational datasets and eddy-resolving numerical experiments. Combining 12 years of Argo profiles and subsurface Argo drift data, pathways and transports of the upper-NADW (1000-2000 m) were studied. The results show clear evidence for interior pathways of upper-NADW that separate from the western boundary near the Grand Banks and flow within a large-scale deep anticyclonic gyre in the northern subtropical Atlantic (30-50°N) that extends to the eastern side of the Mid Atlantic Ridge. Between 15-30°N, the Argo-based circulation and observations from oceanographic cruises show that the mean NADW pathways are characterized by the DWBC flowing southward along the continental slope and multiple localized cyclonic recirculation cells embedded in a larger scale gyre. An assessment of modeled mean potential vorticity (PV) budget shows that the convergence of mean eddy-PV fluxes is responsible for forcing the boundary flow to recirculate locally below 1000 m. Studying the dominant eddies in the region, the PV fluxes appear to be generated by two main types of variability: (1) DWBC meanders with periods of 100-250 days that propagate southward with the current; (2) energetic anticyclonic oscillations with periods of ~500-550 days that occur sporadically. These large eddies slowly propagate northwestward along the continental slope, counter to the direction of the DWBC. Moored current meter records at 26.5°N from 2004-2018 suggest that similar eddies exist in the real ocean and are directly responsible for the DBWC transport variability.