
Maintenance of the seasonal cycle and interannual variability by intra-seasonal stochastic variability in the equatorial Atlantic Ocean

Martin Claus^{*†1}, Richard Greatbatch¹, Peter Brandt¹, Franz Tuchen¹, and Christina Roth¹

¹GEOMAR Helmholtz Centre for Ocean Research Kiel (GEOMAR) – Germany

Abstract

The variability of the zonal circulation along the equator in the Atlantic Ocean is dominated by the seasonal cycle and the presence of the equatorial deep jets (EDJs). The seasonal cycle is externally driven by surface wind variability, however the mechanism which generates and maintains the EDJs against dissipation is not fully understood yet. Additionally, intra-seasonal stochastic variability, the tropical instability waves (TIWs), is generated in the upper ocean by both baroclinic and barotropic instability. The intra-seasonal energy at the equator reaches to depths of about 2000 m. We argue that the intra-seasonal variability gets distorted by the presence of the lower frequency zonal velocity variability. This causes a systematic convergence of intra-seasonal momentum flux such that the seasonal cycle and the EDJs are maintained against dissipation. The presence of this mechanism is demonstrated from two OGCM simulations and moored observations at 23W in the equatorial Atlantic.

*Speaker

†Corresponding author: mclaus@geomar.de