

## Observed Deep Western Boundary Current variability at 34.5°S during 2009-2012

Christopher S. Meinen<sup>1</sup>, Renellys C. Perez<sup>2,1</sup>, Shenfu Dong<sup>2,1</sup>, Alberto R. Piola<sup>3</sup>, Silvia L. Garzoli<sup>2,1</sup>, and Edmo Campos<sup>4</sup>

<sup>1</sup>NOAA/Atlantic Oceanographic and Meteorological Laboratory, Miami, Florida

<sup>2</sup>Cooperative Institute for Marine and Atmospheric Studies, University of Miami, Miami, Florida

<sup>3</sup>Servicio de Hidrografía Naval, and Universidad de Buenos Aires, UMI IFAECI/CONICET/CNRS, Buenos Aires, Argentina

<sup>4</sup>University of Sao Paulo, Sao Paulo, Brazil

### **Abstract:**

Data from an array of pressure-equipped inverted echo sounders extending approximately 600 km offshore from the South Atlantic western boundary along 34.5°S are used to evaluate the time variability of the Deep Western Boundary Current (DWBC) during March 2009-December 2012. Daily variability of the meridional volume transport within the DWBC domain (defined as 800-4800 dbar, 51.5°W to 44.5°W) during this time period ranges between a maximum southward transport of -78 Sv (1 Sv =  $10^6 \text{ m}^3 \text{ s}^{-1}$ ) and a maximum northward transport of 44 Sv, with a standard deviation of 22 Sv about a mean southward flow of -19 Sv. The majority of the transport variability in this ~45 month record occurs at periods between 10 days and a year; the standard deviation after application of a 366-day low-pass filter is reduced to 7 Sv. Baroclinic contributions to this variability (relative to an assumed level of no motion at 800 dbar) are small, but not trivial, as compared to the reference layer variability, with daily standard deviations of 12 Sv and 26 Sv, respectively. Some compensation between the baroclinic and reference layer transports is evident given the reference layer daily standard deviation (26 Sv) exceeding that of the total absolute transport (22 Sv), which is confirmed by a modest negative correlation ( $r = -0.56$ ) between the two components that is statistically significant at the 99% confidence level based on an estimated ~12 day integral time scale.