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Ocean Science Discussions

Interactive comment on "Deep Western Boundary Current transport variability in the South Atlantic: preliminary results from a pilot array at 34.5 S" *by* C. S. Meinen et al.

Anonymous Referee #2

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General Comments

This manuscript presents results describing the variability of the Deep Western Boundary Current (DWBC) at 34.5S in the South Atlantic based on observations from an array of PIES/CPIES. As well as observations, the manuscript uses a numerical model to inform the bottom currents for the PIES calculation of velocity and to investigate the predicted long term behavior of the DWBC. The manuscript provides welcome estimations of the western boundary system in the South Atlantic, which suffers from a paucity of observations.

The major result is the high degree of variability observed in the DWBC at this latitude.

The authors report a huge variance (std: 25 Sv, variations of 40 Sv).

The location of these instruments is very close to the Brazil-Malvinas confluence (BMC). Indeed, Goni et al. [1996] incorporated an array of PIES at 35S to estimate the dynamics of the BMC. How do we know that it is not variability derived from the highly variable confluence that is being observed rather than the DWBC of the South Atlantic?

The measurements are also very close to the Zapiola anti-cyclone. Could variability from this anticyclone be contributing to the variability seen in these measurements?

This to me is the crucial question pertaining to this manuscript: can we be sure the variability measured is representative of the South Atlantic DWBC as part of the South Atlantic MOC and not variability derived from other influences?

Specific Comments

Figure 4 compares the PIES with CTD with the authors saying that the figures compare well. However, I see opposite concavity in the isopycnals particularly around site C. This would imply different currents. Could the authors comment on this.

The authors mention that the variability seen at 34.5S (std: 25 Sv, variations of 40 Sv) is comparable to that at 26.5N (std: 16 Sv, variations of 10 Sv - Meinen et al. [2012]). I would like more elaboration on the comparison as these numbers look quite different to me.

The array is along a line of latitude rather than orthogonal to the continental slope. A western boundary current would be expected to some extent to follow the topography. Can the authors comment on the choice of arrangement of the instruments and errors that may arise from that choice?

The integration domain from 800-4800 dbar is based on work at 26.5N. Why would the authors not choose a domain more representative of the region? Say 1000 (AAIW depth) to 4100 (AABW at the 0C isotherm).

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Further elaboration on the PIES methodology and especially its particular application to the South Atlantic would be of use here.

An indication of the location of the BMC and the Zapiola anticyclone would be useful in Figure 1.

The authors decline to comment on the currents from the CPIES at site B. It strikes me that a comparison between these currents and the currents derived from the model would provide validation of that model. It is not clear to me why this has not been investigated.

Technical Corrections

There are no labels on the x-axis in Figure 2. Exhaustive use of "e.g." in the references: 11 times in the first two sections. If there are more references, they could be explicitly listed.

Interactive comment on Ocean Sci. Discuss., 9, 977, 2012.