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Comment

## ***Interactive comment on “Intrinsic variability of the Antarctic Circumpolar Current system: low- and high-frequency fluctuations of the Argentine Basin flow” by G. Sgubin et al.***

### **Anonymous Referee #2**

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**General comments** The variability of the ocean circulation at low and high frequencies is analyzed in the Argentine Basin by means of a sigma-coordinate ocean model adequately constrained by bottom topography to reproduce the circulation around the Zapiola Drift (ZD). Main results suggest that the low-frequency component of the circulation undergoes from a “collapse regime” to a strong anticyclonic circulation around the ZD, in good agreement with satellite altimetry analysis by other authors. The high frequency regime suggests the presence of a topographic Rossby-mode propagation along the eastern and southern flanks of the ZD and of mesoscale eddies, also in agreement with satellite altimeter and model outputs observations by other authors. Despite not describing essentially new findings, the discussion section gives useful

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insights of possible links between low and high frequency regimes that will certainly inspire future works. However a number of specific questions are raised. In particular the absence of the Brazil Current makes disappear the Brazil-Malvinas Confluence (BMC). As a consequence the mean circulation obtained by the model is somewhat unrealistic. Furthermore, as the BMC region is by far the main factory of eddies in the South Western Atlantic (see Chelton et al 2011 or Saraceno and Provost, 2012), and eddies are believed to drive the circulation around the ZD, comparison of the results with those obtained by other authors that used observations (or included the BMC in their models) is questioned.

Specific comments 1) Figure 5b shows velocity derived from mean SSH from the model. Two very anomalous patterns are observed: - Currents over the northern portion of the Patagonian shelf are as intense as the Malvinas Current, which is very unrealistic; - A southward flow parallel to the Malvinas Current could be associated to the Malvinas Return Flow. However it is as intense as the Malvinas Current. According to the figure it looks like this flow is the main source of the ZD anticyclonic circulation. Both features do not correspond to observations. It is most likely that these artifacts are due to the absence of the Brazil Current (BC) coming from the North. It is suggested that a larger domain model, which includes the BC, should be considered to ease the comparison with results from other authors.

2) It will be great to have a map with the RMS of the non filtered SSH obtained by the model. When the BMC is included, the RMS of the non-filtered SSH is maximum at the BMC region and has a relative minimum centered in the ZD region. Saraceno and Provost (2012) show that the latter observation is due to a lower number of eddies in the region isolated by the ZD current. But again, it is difficult to compare with other studies that do have the BMC.

3) Most of the discussion is based on the time series constructed from the two boxes defined in figure 10. Box “B” seems to include a larger portion of the ACC domain than of the ZD domain.

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Technical corrections The manuscript is easy to read. A few sentences could be more precise, but the message is, to my point of view, understandable. Perhaps authors could make an effort to diminish the number of figures.

It will help if figures with maps (like figure 5): - Use a geographical projection; - Include the main position of the fronts and - The potential vorticity contours that define the ZD.

Units are missing in the legend of figure 2. Add latitude and longitude to figure 1.

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Interactive comment on Ocean Sci. Discuss., 10, 1933, 2013.

**OSD**

10, C746–C748, 2013

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