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Ocean Science Discussions

Interactive comment on "Transport Variability of the Brazil Current from Observations and a Model" *by* Claudia Schmid and Sudip Majumder

Anonymous Referee #1

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The manuscript by Schmid and Majumder uses observational estimates and an ocean model run to evaluate the transport and variability of the Brazil Current (BC). The authors have put together an interesting data set but results are inconclusive. The authors describe the BC in their data, agreeing reasonably well with previous estimates and compare their observational values with an ocean model experiment, which however is poorly described in the manuscript. The interannual variability is also poorly described, with a superficial analysis and correlation with climate indeces. The description of these correlations is either very thin on dynamical explanation or simply not informative. For example, the authors correlate the BC with the AMO, noting that correlations are not robust as expected given that the AMO is an index based on North Atlantic SST anomalies.

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Discussion paper

General Remarks

The model run is poorly described. How was the model forced? why are the authors using a reanalysis for the period 1993-2012 and then an analysis (free run?) for 2013-2015? A free run and a data assimilating model are two different models, which often have little in common. The model data, as used in the manuscript, do not add any relevant information or mechanism. I suggest to either thoroughly compare observations and model, and use the model data to perform more in-depth analysis, or simply discard model results and focus on the observational data set and its comparison with previous estimates.

The observational data sets, as presented, are confusing. Temperature and Salinity go from 2000 to 2015. Velocities from 1989 to 2016. Satellite data from 1993 to 2015. Most figures are presented for the period 1993-2015 so you should just present that common period.

Minor points

page 2 line 4: The mean transport of the Brazil Current RANGES from 3.8 ... page 2 line 13: It would be useful to state in the abstract what is the main result of the EOF analysis. page 4 line 10: not sure what you mean here. The Western Boundary Current is not in Sverdrup balance. page 8 line 9: what are all these experiments? no information is given on the model, how it was forced, for how long and whether it is reproducing the BC realistically. page 9 line 8-10: some text is missing here or the English should be improved. page 9 line 12: it seems to me from Fig.3 that the model produces a vigorous BC further north, and that 25S would be more appropriate. page 9 line 16: I think you should clearly state that the model seems to produce feeding westward currents that are located further north, say at 26S and 21S. page 9 line 20: what is the 'full' period? page 9 line 21: Who is 'they'? page 11 line 16: (Figure 4) It is also true that previous estimates seem to agree better with the model and fall within the simulated standard deviation (red) rather than the observational data set

(black). Given that the model has a very fine horizontal resolution, and presumably it is simulating most eddy activity in the region, it could well be that the observational data are giving you too-weak transports. page 12 line 6: TOPEX/POSEIDON page 12 line 10: You have concluded before that the BC is not well defined north of 25S as it is not fed by the westward current. So why discuss here the 'northern region' north of 25S? page 13 line 20: showing the EKE from the obs and the model seems very important so I don't understand why the authors have decided not to show this. page 14 line 7: why have you chosen these three latitudes: 24S, 35S and 38S? page 15 line 5: you give an estimate of 7.9 to 26.2 Sv, but these values are not reproduced in Fig.5, which shows a max value of around 21Sv. If it is due to filtering the authors should clearly state that they are talking about unfiltered data. page 15 line 19-22: sentence very difficult to read. I suggest rewriting this paragraph. page 18 line 1-6: This is very superficial and not useful. Maybe a power spectrum cold give an indication of the variability and its significance? page 18 line 8: why did you choose these indices: SAM, NINO3.4 and AMO? why not local interannual indices like the Atlantic Meridional Mode or the South Atlantic dipole indices? Later, little dynamical explanation is given for the correlation, or lack of, between these indices and the BC. page 19 line 9: the AMO is a North Atlantic index. So why did you use it? what were you expecting to find? I suggest removing any discussion on the AMO. page 19 line 10-12: I don't find this conclusion convincing. You find the largest correlations where the BC is weak and not entirely formed. At 24S the BC has not received most of the westward current flow. You should look at the core of the BC and find significant correlations. page 21 line 12: what is the mechanism proposed by Lopez et al.(2016)?

page 21 line 12: I find it hard to find the 'scope' of this manuscript. What are the main goals and conclusions of this manuscript? they should be stated and clearly presented. page 22 line 3: I would remove the mode data as they do not add anything to the conclusions. page 22 line 22: very vague statement on the variability of the current. page 23 line 8: again, please remove any analysis related with the AMO

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