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Ocean Science
Discussions

Interactive comment on “Properties and mass transport differences across the Falkland Plateau between 1999 and 2010” *by* M. Dolores Pérez-Hernández et al.

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Interactive comment on “Properties and mass transport differences across the Falkland Plateau between 1999 and 2010” by M. Dolores Pérez-Hernández et al. Anonymous Referee #1 Received and published: 5 February 2017 Review of the paper by M. Dolores Pérez-Hernández, Alonso Hernández-Guerra, Isis Comas-Rodríguez, Verónica M. Benítez-Barrios, Eugenio Fraile-Nuez, Josep L. Pelegrí, and Alberto C. Naveira-Garabato "Properties and mass transport differences across the Falkland Plateau between 1999 and 2010" The authors present a very detailed analysis of water masses in the region of the Falkland Plateau and their comparison between 1999 and 2010 on the basis of two hydrographic sections in the region. However, the main goal of their study

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is comparison between the properties and mass transport across the Falkland Plateau. The analysis of the differences and causes is not sufficient for immediate publication. This region is the location of the beginning of the Falkland Current but the authors just mention this fact as not very important. We thank the reviewer for his/her comments. In lines 45-48 specify how the ACC contributes to the Falkland current with 60-70 Sv. The cruises were made in different seasons of the year: the austral fall and summer (April and February). The changes in the water properties and dynamics between these two seasons can occur not only in the surface layer as the authors report. It is well known that the seasonal changes in the Falkland Current are very strong. The changes in the geostrophic component of the Falkland Current may reach the depths of 2000 m. Since the changes in the Falkland Current exist, similar changes may occur in the region where the current starts. Some analysis of what had happened between 1999 and 2010 is needed. The authors cite a publication by BÅSning et al. [2008], but this paper analyzes the changes in the ACC caused by decadal changes in the wind field. We agree that it would be interesting to know the seasonal contribution, but in trying to infer this, we did not find any other oceanographic cruises occupying the region, either enough Argo floats (the program started in 2004) as can be seen in the figure below from the Coriolis data centre. This highlights the importance of publishing this study. It provides with a comparison between the only two high-resolution data available in the area. This important point has been clarified in the introduction and discussion of the revised manuscript.

I would appreciate an analysis of the AVISO data in the region and variations in the geostrophic currents during the study period (or at least in the period when the AVISO data are available and reliable). The analysis of the seasonal changes in the geostrophic currents is important. Then, this analysis should be linked with the observations performed with an interval of 11 years. The changes that occur over a period of 11 years and the seasonal changes should be separated. The changes in mass transport even in the subsurface layers can be associated with the seasonal changes in winds. I am sure that some CTD data from the stations occupied in the region in

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the years between 1999 and 2010 can be found in the databases and added to the analysis. The main drawback of the analysis presented in this manuscript is complete absence of any data related to the period of 11 years. We agree in that we should provide with a quantification of the seasonal geostrophic changes between both cruises. We have included an analysis of the AVISO derived geostrophic transport in our section 3.5 Relative geostrophic transport changes and in the discussion of the revised manuscript. It consists of the following figure and text. In 3.5 Relative geostrophic transport changes

Fig. 10. East to west accumulated relative geostrophic mass transport from AVISO averaged from 1993 to 2016 together with their standard deviations: February (black solid line) and April (grey solid line). For this calculation, the depth of 50 m has been considered to compute the mass transport that corresponds to SASW. Dashed lines are the east to west accumulated relative geostrophic mass transports shown in Figure 7 for the SASW for the MOC Austral (black) and ALBATROS (grey) carried out in February and April, respectively. "To put all the estimated transports in context, the monthly 1993-2016 averaged geostrophic velocities from AVISO are interpolated to the station pairs of both cruises and integrated by using the stations distance and the average depth of the SASW stratum (50 m). This is shown in Figure 10, where the 1993-2016 average of all Februaries (Aprils) is contrasted with the estimated relative transport of the MOC Austral (ALBATROS) upper stratum. It is seen that there is no climatological significant difference between the estimations of both months. Hence, the positions and transports (expressed as mean $\pm$ standard deviation) of the SAF and PF in the AVISO derived transports are 2.5$\pm$0.5 Sv at the longitudinal range 52.97-56.96°W and 1.1$\pm$0.7 Sv at 47.49-51.34°W, respectively. The SAF AVISO estimated transport is approximately the average between the SASW transports of the ALBATROSS (3.2 Sv) and MOC Austral (1.9 Sv). The PF observed in the AVISO data covers a wider range of longitudes than the ones of the hydrographic surveys. Its transport is slightly smaller than for the ALBATROSS cruise (2.0 Sv) and non-significantly different from the MOC Austral (1.6 Sv) at the SASW stratum (Table 1)."

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In the discussion: "The AVISO climatological seasonal transport average is non-significantly different between February and April. Thus, the observed changes in transport are due to interannual variability."

I can recommend this manuscript for publication only if such analysis would be added. Major revision is currently needed. A few minor remarks. Do not use different notations in one figure. Red and black dots in Fig. 1a and black and gray dots in Fig. 1b. Yes, in the figures when we compared both years we have chosen to use black (grey) for the MOC Austral (ALBATROSS) cruise (Figures, 1b, 7 and 9), but for Figure 1a we have changed the color for ALBATROSS cruise to red, to be able to discern in between both cruise stations. Is Fig 1b is just a copy of the figure from another text? It is not, we have the used the novel temperatures and salinities from the MOC-Austral cruise and combined them with the ones from 1999 to see the difference between both years in a unique plot. What are the units of color scale in Figs. 3 and 4? I recommend changing color in one of the color scales not to use tones of red and blue in both color scales with different units. Do not use the same colors for different properties. For Figure 3 the units are cm/s and we agree that they should be shown in the figure or caption. We apologize for the inconvenience; this error has been fixed in the caption of Fig.3 of the revised manuscript. In contrast, Figure 4 clearly shows its units on the y-axis. We have followed your advice on using different color scales for each variable on the revised manuscript being: (1) velocities, red to blue, (2) potential temperature anomalies, orange to blue and (3) salinity anomalies, purple to green.

Please also note the supplement to this comment:
http://www.ocean-sci-discuss.net/os-2016-89/os-2016-89-AC1-supplement.pdf

Interactive comment on Ocean Sci. Discuss., doi:10.5194/os-2016-89, 2016.

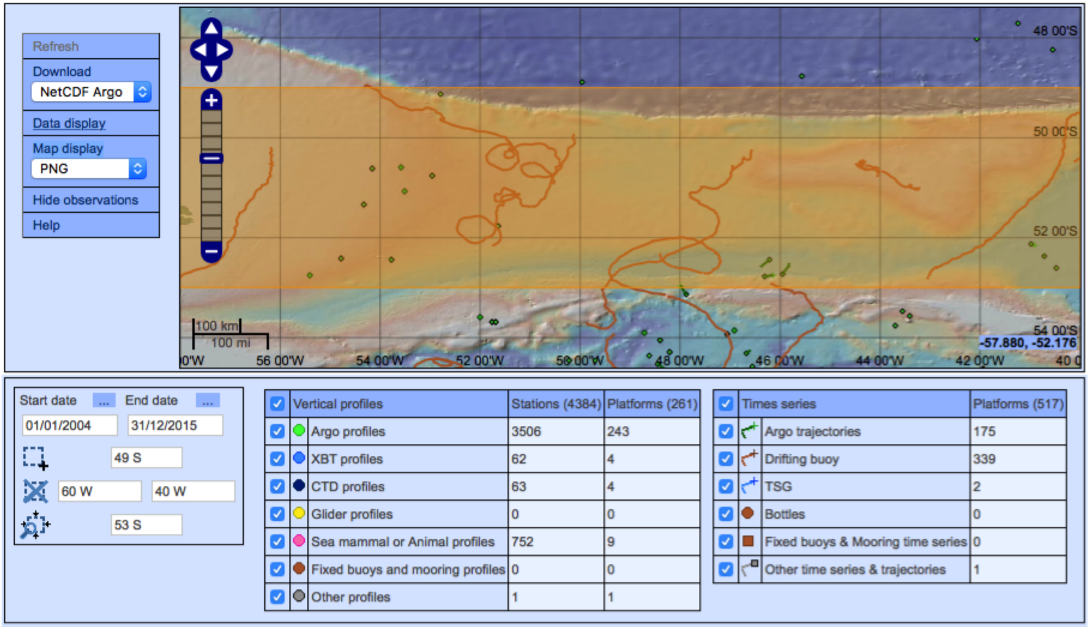

Fig. 1. Coriolis Data Center

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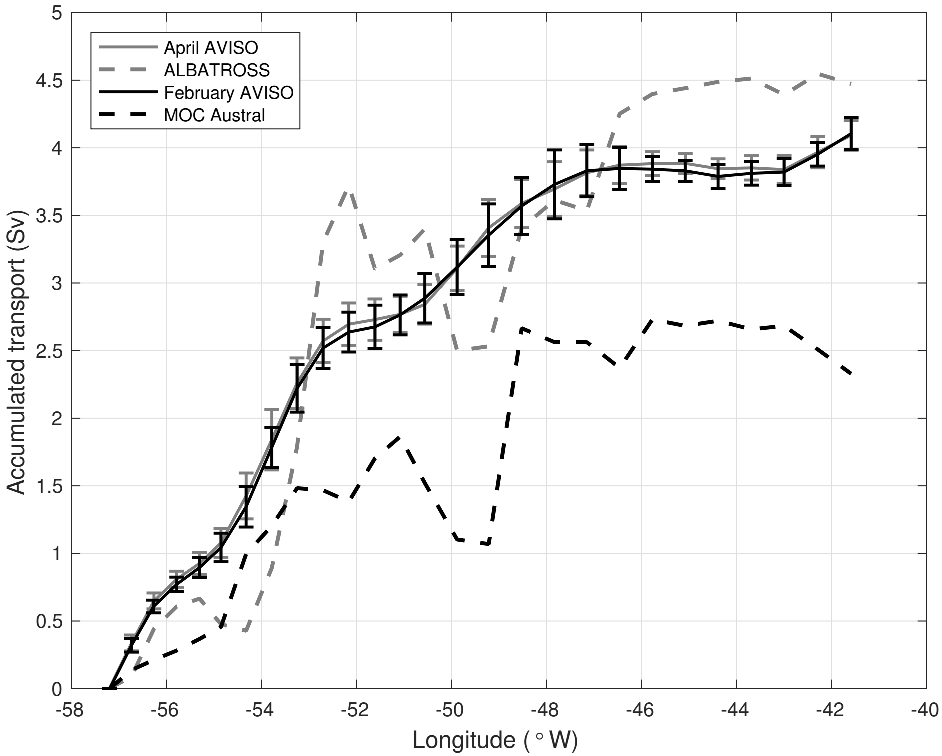

Fig. 2. Figure 10

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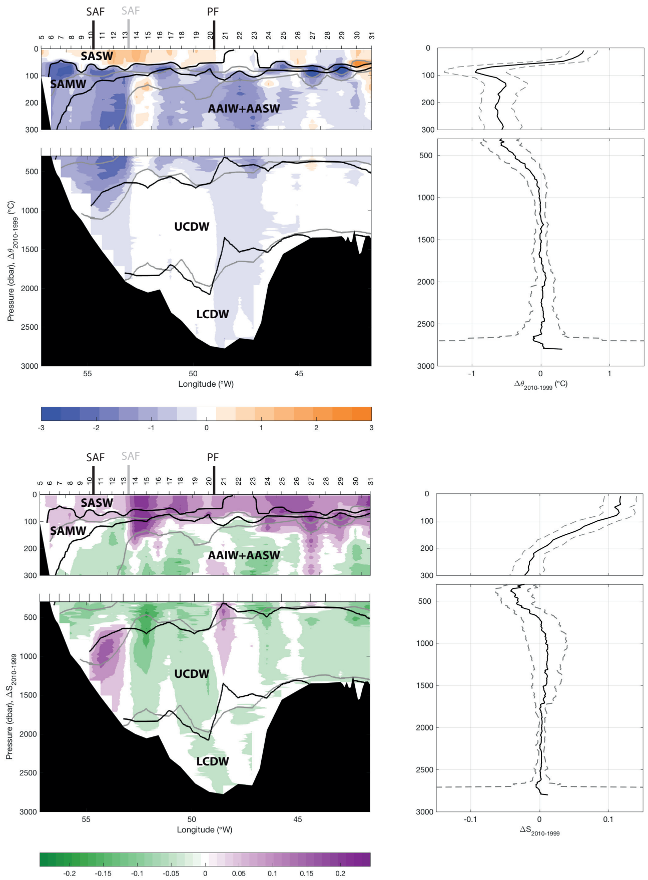

Fig. 3. New Figure 4

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