

# ***Interactive comment on “Sea surface salinity and temperature in the Southern Atlantic Ocean from South African icebreakers, 2010–2017” by Giuseppe Aulicino et al.***

## **Anonymous Referee #1**

Received and published: 1 May 2018

This paper describes new measurements of sea surface salinity that are very valuable for the scientific community working on the Southern Ocean, and in particular for validating satellite salinity. Very few in situ measurements are available in the Southern Ocean which makes this unique data set particularly interesting. Data quality seems to have been carefully checked. Nevertheless, more details need to be given before accepting this manuscript for final publication. My main concerns are that: -Criteria for sorting out bad data are rather vague -figures and statistical indicators are limited to a few cruises and need to be extended to the whole data set. -It is unclear where SST and SSTH are measured and how they are used for deriving SSS. -the depth of the measurement is not given. Even if it probably varies depending on the sea state

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conditions, an approximated range should be indicated. -Comparisons with other fields (section 3) is very interesting but the interest of this new data set (e.g. for detecting sharp latitudinal gradients) could be better enhanced.

Detailed comments: Line 17 : explicit SA Line 40 : though salinity AND TEMPERATURE values Line 51: meaning of 'the correspondent sector of the Southern Ocean' is unclear Line 52: this sentence is unprecise: strictly speaking, the calibration applies on satellite raw measurements, not on salinity retrievals; change in e.g.: improve the satellite calibration, SSS retrievals algorithms and better validate them in these regions. Lines 60-78: This part would better fit within data and methods section. Lines 63-65: It is unclear what is the interest of the temperature cell as, according to Figure 1, it does not measure the temperature of the water analyzed in the conductivity cell (it is not within the TSG), nor the hull temperature. The monitoring of the temperature in the conductivity cell is necessary to ensure a precise salinity, but this is not mentioned. On another hand, oceanographers are interested in the density of the in situ sea water, so I would expect it is the hull temperature that is of interest for computing density. Lines 89-92: It is unclear where SST and SSTH are given these sentences and Figure 1 (see also my previous comment). It would be useful to indicate SST and SSTH on Figure 1. Lines 97\_98: what are the chosen threshold values? Line 109: are the cruise reports publicly available? Lines 104-111: Criteria for eliminating episodic quick decreases of conductivity associated with air bubbles and harbour data and observations collected when sailing into icefields are vague. I understand that some of the sortings is probably somewhat subjective but it needs to be done in a repeatedly way from one cruise to another and the magnitude of possible remaining contamination has to be indicated based on the criteria used for sorting out bad data. This would help to interpret the validation done in next section. Line 115, Lines 177-178: what is the expected sea ice contamination? Presence of ice crystals in the TSG? Or actual local low SSS values linked to ice dilution? Lines 121-123: I would expect each SSS to be given together with the conductivity and SST used to derive it: isn't it the case? Lines 135-136: Figure 3 and Figure 4 only show comparisons for a given cruise. This is not enough to assess

the quality of the whole data set. A compilation of the results obtained with all cruises should be given, for instance the mean and standard deviation of the difference per latitudinal bin, as well as a table indicating for each cruise, the mean bias and standard deviation between bottle and TSG SSS. Line 136: what is called 'an error rate of 8%'? What is the corresponding statistical indicator? Lines 164-182: Again, only examples are illustrated on Figure 5 and 6, a compilation of the results obtained for all the cruises needs to be given. I don't understand Figure 6: on Figure 6a, TSG SSS are much less scattered than on Figure 6b: which smoothing or filtering is applied? The text indicates a very good agreement between bottle samples and TSG SSS: this is not evident at all from figure 6b. As suggested previously, statistics for each cruise describing bottle-TSG comparisons should be given. Units harmonization: in previous sections SSS was given without unit, here it is given in pss

Table 3: Again description of SST measurement is unclear: SSTH, the hull SST, should not be called TSG SST as the measurement is made outside the TSG. Is SST a measurement done within the TSG or outside (as suggested by Figure 1); a TSG delivers a conductivity measurement, not a salinity. In the text, SSS are given without unit (it is indicated in the introduction that they are given on the pss scale), not in psu. Legend of Figure 2: need to indicate units of bathymetry. Legend of Figure 6: remove 'Another comparison of'

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Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2018-40>, 2018.

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