

New dedicated SSS product for the Southern Ocean

We are pleased to announce the publication of the **first** dedicated **SMOS Sea Surface Salinity (SSS)** products for the **Southern Ocean** produced at BEC (<https://doi.org/10.20350/digitalCSIC/15493>). These new SMOS Sea Surface Salinity products specific for the Southern Ocean have been created under the **Southern Ocean Freshwater (SO-Fresh) ESA project** (contract A0/1-10461/20/l-NB).

The retrieval of satellite SSS in this region is a grand challenge due to several technical difficulties, among them: (i) the contamination of the radiometric signal close to sea ice, (ii) the low signal-to-noise ratio of SSS due to the low sensitivity of L-band radiometry to salinity on cold waters and (iii) the reduced variability of SSS in the SO, which implies that more accurate retrievals are needed over the Southern Ocean.



In this context, we have developed algorithm improvements from the level 0 to level 3 for the generation of this dedicated SSS product, mainly focused on the aspects highlighted above. In particular, we have adapted the Nodal Sampling ([González-Gambau et al., 2016](#)) to avoid contamination close to ice edges, allowing the reduction of the radiometric errors very significantly and we have modified the Debiased non-Bayesian retrieval ([Olmedo et al., 2017](#)) to correct systematic biases in salinity as a function of the distance of the measurement to sea ice. In addition, a dedicated study has been performed to select the best sea surface temperature product over the region to be used in the SSS retrieval.

This product has been extensively validated through the comparison to in-situ measurements from Argo, Astrolabe and in

situ measurements provided by marine mammals and the Barcelona World Race and Vendée Globe regatta. The use of these in situ databases has allowed a global analysis but also a seasonal analysis and as a function of the distance to the ice edge. The SO-FRESH SSS product shows:

- a very high performance far from the ice edge (null bias and ~ 0.17 psu of STD),
- a proper description of the Antarctic Circumpolar Current,
- where there's freshwater near the ice, but sometimes the satellite detects saltier levels, especially within the first 100 kilometers of the ice's edge
- a seasonal and interannual variability consistent with the variability shown by the model [GLORYS](#).

Therefore, this product has been demonstrated to be suitable for understanding rapid changes in recent years, encompassing ocean warming, freshening, reduced sea ice extent, and the emergence of the offshore Weddell Polynya, characterized by ice-free areas within the sea ice zone.

More information about how to access the data and its metadata can be found in the [SO-FRESH Product User Guide](#). Please, do not hesitate to contact us in case you have any questions or comment at smos-bec@icm.csic.es. Your feedback is most welcome!