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Recent advances in the salinity retrieval algorithms for Aquarius and Soil Moisture Active Passive (SMAP)

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Our presentation discusses the latest improvements in the salinity retrievals both for Aquarius and Soil Moisture Active-Passive (SMAP) since the last releases. The Aquarius V4.0 was released in June 2015. The final V5.0 release is planned for late 2017. SMAP V 2.0 has been released in September 2016. We will present validation results for both Aquarius V5.0 pre-release and SMAP V2.0 salinity comparing with near-surface salinity measurements from Argo floats.

We show that salty biases at higher northern latitudes in Aquarius V4.0 can be explained by inaccuracy in the model used in correcting for the absorption by atmospheric oxygen. These biases will be mitigated in V5.0 by fine-tuning the parameters in the oxygen absorption model.

The full 360–degree look capability of SMAP makes it possible to take observations from the forward and backward looking direction at the same instance of time. This two-look capability aids the salinity retrievals. One of the largest spurious contaminations in the salinity retrievals is caused by the galactic reflection from the ocean surface. Because in most instances the reflected galaxy appears only in either the forward or the backward look, it is possible to determine its contribution by taking the difference of the measured SMAP brightness temperatures between the two looks. Our result suggests that the surface roughness that is used in the galactic correction needs to be increased and also the estimated strength of some of the galactic sources need to be slightly adjusted. The improved galaxy correction has been implemented in SMAP V2.0 retrieval and will be included in Aquarius V5.0 as well. It helps the mitigation of residual zonal and temporal biases that were present in both products.

Another major cause of the observed zonal biases in SMAP is the emissive SMAP mesh antenna. In order to correct for it, an accurate knowledge of the emissivity of the antenna and its physical temperature are required. We discuss the improvements in the correction for the emissive SMAP antenna in SMAP V2.0 over V1.0.