National Aeronautics and Space Administration
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Evaluation and Intercomparison of SMOS, Aquarius, and SMAP Sea Surface Salinity Products in the Arctic Ocean (Séverine Fournier)

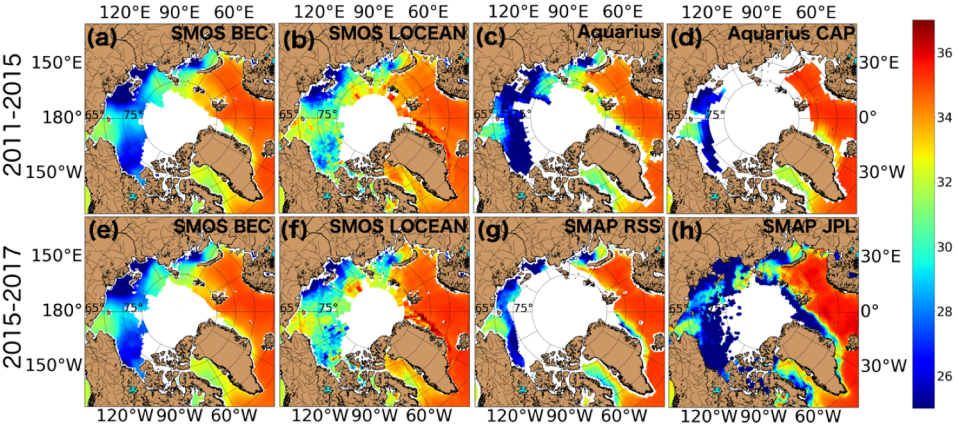

Figure 1: Annual mean of SSS over (a–d) 2011–2015 and (e–h) 2015–2017 from several commonly used SMOS, SMAP and Aquarius SSS products.

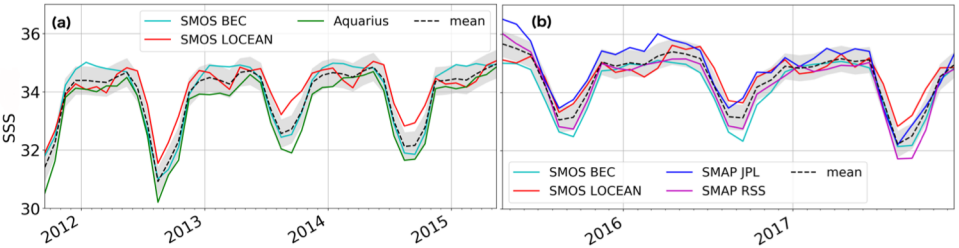

Figure 2: Monthly SSS time series in the Arctic Basin over 65 °N. The black dotted line represents the average over the SSS products, the shading represents the spread of SSS products around the average.

Problem: Sea surface salinity (SSS) is a critical parameter in the Arctic Ocean, having potential implications for climate and weather. A systematic evaluation of satellite SSS products in the Arctic Ocean across different missions has not been done, hindering the ongoing cal/val and potential applications.

Finding: The SSS from ESA SMOS and NASA SMAP and Aquarius have similar time-mean, large-scale patterns (Figure 1) and are consistent in revealing the regions with strong temporal variability. When averaged over the Arctic Ocean, the SSS show an excellent consistency in describing the seasonal and interannual variations (Figure 2). Satellite SSS capture salinity gradients observed along ship transects. The consistency of satellite and in situ SSS degrades with decreasing temperature, reflecting the limitation of current satellite instrument sensitivity to SSS in cold water.

Significance: The results have significant implications for the calibration and validation of satellite SSS as well as for the modeling community and the design of future satellite missions.

Fournier S., Lee T., Tang W., Steele M., and Olmedo E. (2019). Evaluation and Intercomparison of SMOS, Aquarius, and SMAP Sea Surface Salinity Products in the Arctic Ocean. Remote Sensing,