National Aeronautics and Space Administration
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Seasonal and interannual variability of sea surface salinity near major river mouths of the world ocean inferred from gridded satellite and in-situ salinity products (Séverine Fournier)

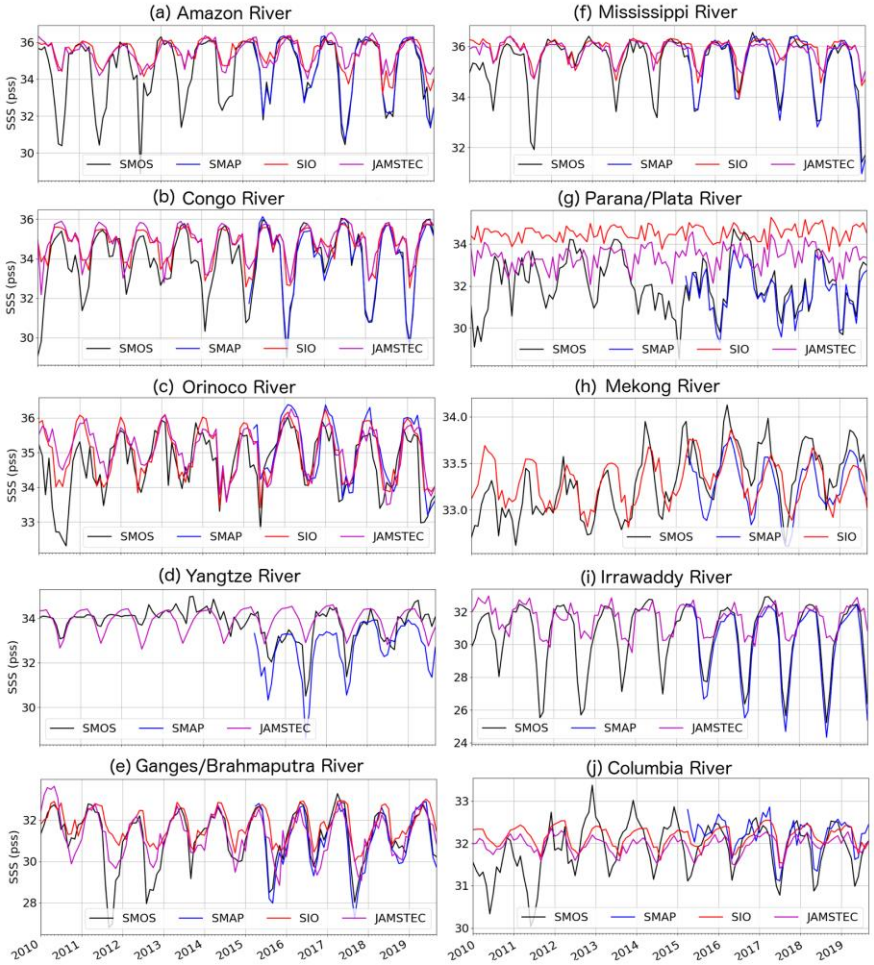

Figure 1: Monthly time series of SSS maps from 2 satellite (blue and black) and 2 gridded in-situ (red and magenta) products within 300 km of the mouths of the 10 largest rivers worldwide at low to mid-latitude. 300-km is the nominal spacing of the near-global in-situ robotic instrument array called Argo.

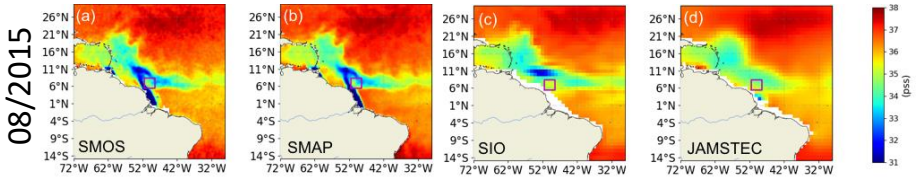

Figure 2: August 2015 SSS maps from 2 satellite (a, b) and 2 gridded in-situ (c, d) products near the mouth of the Amazon River.

Problem: Large rivers, key components of the land-ocean branch of the global water and biogeochemical cycles can have important impacts on coastal oceans. Sea surface salinity (SSS) is a critical observable for monitoring river plumes and studying their impacts. Satellite and in-situ SSS gridded products have been used to characterize the variability of some river plumes. However, their consistency have not been examined systematically for near major river mouths of the world ocean.

Finding: The SMAP and SMOS satellites have excellent consistency in depicting seasonal-to-annual variations of SSS near the mouths of the ten largest rivers in low- to mid-latitude oceans. Two widely-used in-situ products (SIO & JAMSTEC) underestimate these variations substantially due to the limited in-situ sampling of the active river plumes following the high discharge season (Figures 1 and 2) despite the relatively good consistency between them. These in-situ products should not be used as benchmark to assess the accuracies of satellite SSS in river plume regions.

Significance: This work has implications to the ocean modeling and assimilation community for using the satellite SSS to evaluate and constrain models. Also, satellite SSS can be potentially used to inversely constrain the estimates of discharge variability for rivers that are poorly gauged.

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