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Intraseasonal to interannual Sea Surface Salinity Variations in the Tropical Pacific Ocean

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Sea Surface Salinity (SSS) is one of the key factors influencing the ocean circulation but is also an important indicator of the hydrologic cycle. Understanding processes associated with various SSS regimes is thus crucial to the knowledge of ocean dynamics and of the connection between the ocean and the water cycle. SSS variability is studied between 2010 and mid-2016 in the tropical Pacific Ocean using various datasets such as observations from the satellite missions Soil Moisture Ocean Salinity (SMOS), Aquarius SAC/D and Soil Moisture Active Passive (SMAP); in situ measurements from Argo, voluntary ships and dedicated campaigns; and a forced simulation of the Nemo ocean model.

This study focuses mainly on variability north of the Equator, around 10ºN. The interannual signal of SSS is particularly intense in this region in 2015, with a very strong and wide freshening and enhanced precipitations. The SSS signature associated with El Niño is however rather centered at the equator. The mechanisms behind the observed freshening and the link to Pacific Ocean state are evaluated by computing each term of the mixed layer salinity budget using the numerical simulation.

At the intraseasonal time scale, we underline two processes: the rain events signature on SSS of the order of -.2 pss/mm/hr in SMOS surface measurements and the motion of eddies formed by the Central American coast propagating at a speed of about 17 cm/s within the tropical current system.

Understanding the dominant temporal and spatial scales of SSS in the tropical Pacific Ocean is primordial as a support for the NASA's second Salinity Processes in the Upper Ocean Regional Study (SPURS-2) which first campaign will take place in August-September 2016 in the northeastern equatorial Pacific. SSS datasets presented in this study provide a large-scale context to understand salinity processes that will be observed by the in-situ data collected during field experiments.