



An Examination of the Sea Surface Salinity - Fresh Water Flux Relationship Using Satellite Observations from SMOS and Aquarius

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Relationship between the sea surface salinity (SSS) and the oceanic fresh water flux (E-P) is examined using the SSS retrievals derived from the passive microwave (PMW) observations aboard the SMOS and Aquarius satellites, the CMORPH integrated satellite precipitation estimates (P) and the evaporation data (E) produced by the NCEP Climate Forecast System (CFS) reanalysis. Preprocessing is performed to construct gridded fields of SSS, P, and E on a 1° lat/lon grid over the global oceans and at a 30-min time resolution for a 54-month period from January 2010 to June 2014. Relationships between the SSS observed at a point in time and the P, E, and P-E at the same grid box accumulated over various time periods ending at the SSS observation time are examined.

As a first step, we focused our investigation on an oceanic area over the central equatorial Pacific (10°S-10°N; 180°-160°W) where SSS is not influenced by the river runoffs. Our preliminary results show clear linear relationship between the satellite-observed skin SSS and the fresh water flux over the region. The Aquarius observed instantaneous SSS presents a correlation of ~ 0.4 with the E-P accumulated over the 30-min period of the SSS observations. The correlation between the instantaneous SSS and the E-P drops with the accumulation period for E-P, down to 0.36 for 6-hourly accumulated E-P. The Correlation, however, bounces back and improves with the E-P accumulation period longer than 6 hours, reaching to ~ 0.7 for an accumulation time period of 30 days. The existence of the minimum correlation between the instantaneous SSS and the E-P accumulation over a 6-hour period suggests the involvement of air-sea interaction and oceanic processes on multiple time scales in the manner E-P influences to the SSS variations. Among the two primary components of the fresh water flux, precipitation dominates the influences on the SSS. Further analysis is under way to repeat the examination for different regions to examine the regional dependence and seasonal changes of the SSS – fresh water flux over the global ocean and to examine the underlying physical processes. Detailed results will be reported at the EGU meetings.