#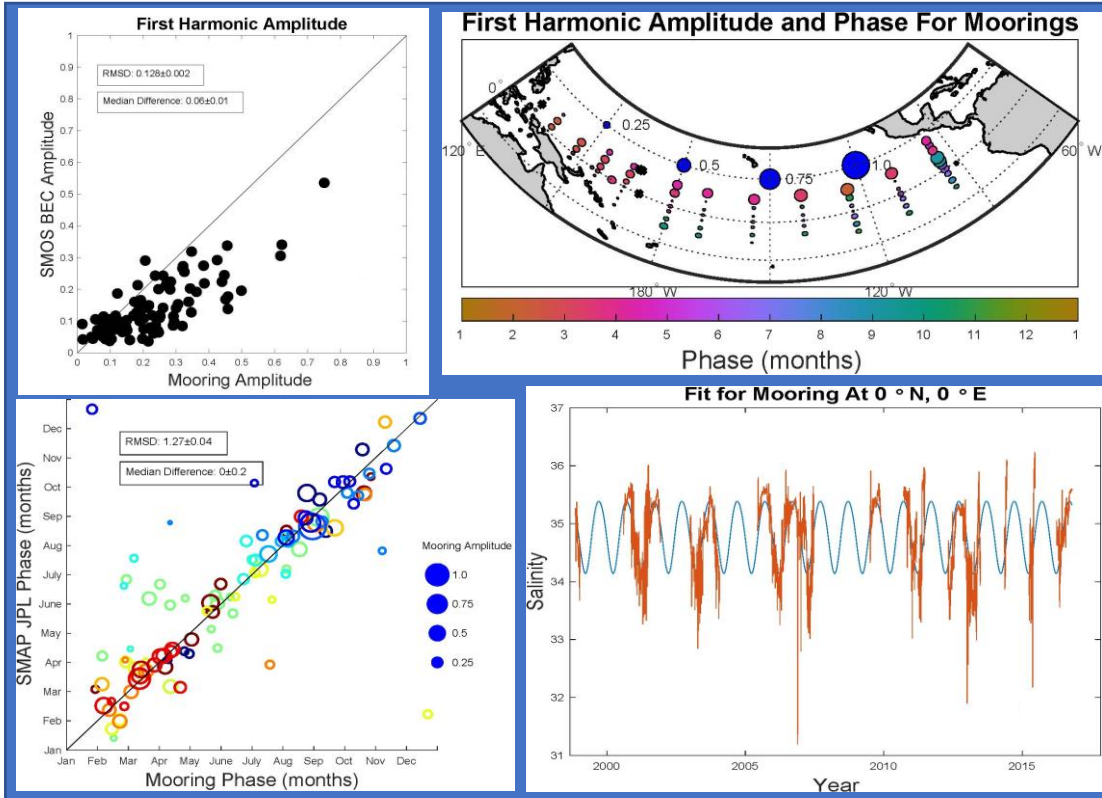 Sea Surface Salinity Seasonal Variability in the Tropics from Satellites, Gridded In Situ Products and Mooring Observation

Problem: Seasonal comparisons of sea surface salinity (SSS) data sets in previous studies were limited by not including mooring data. Incorporating these data sets allows a more detailed comparison of amplitude and phase than in any previous studies.

Data and methods: SSS data sets from two gridded in situ (EN4 and SIO), one in situ moored, and six satellite products were used to complete a standard harmonic analysis. The harmonic analysis yielded amplitudes, phases, and fractions of variance (R^2) associated with annual and semi-annual harmonics. Comparisons of amplitude, phase, and R^2 between moorings and all the satellite and gridded in situ products were also completed.

Key findings: Using observations from moorings in the global tropical moored buoy array (fig. 1), the study validated the seasonal SSS from the different products. There was good agreement in most of the amplitudes and phases.

Broader significance or implications: The implications of this study are that seasonal SSS measurements from satellite and in situ products do not exactly match mooring data but do provide an accurate representation of seasonal SSS variability. Further research is needed to explain the precise causes of differences in measurements among the products.

Upper left: Scatter plot of first harmonic amplitude. Mooring amplitude for SMOS BEC.
Upper right: First harmonic amplitude and phase for moorings in the Pacific basin. Color of each symbol indicates the phase. Area of the symbol indicates amplitude. Scale shown in dark blue.
Lower left: Scatter plot of first harmonic comparison product phase vs. mooring phase. Colors of symbols indicate latitude of mooring.
Lower right: Fit for Mooring at 0° N, 0° E Harmonic fit (blue), gridded mooring data (red)