

# Monitoring of Sea-Surface Salinity through Combined Use of Satellite Observations and In-Situ Measurements and Freshwater Flux



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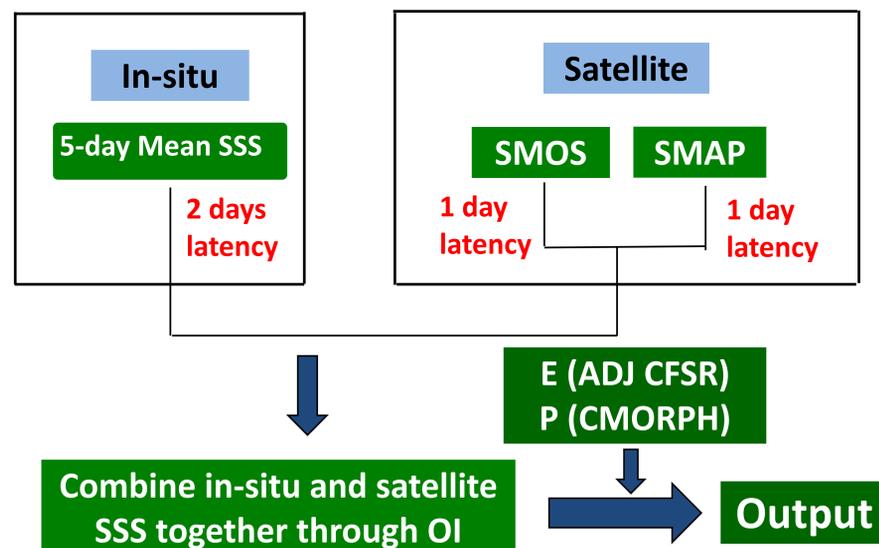
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## INTRODUCTION

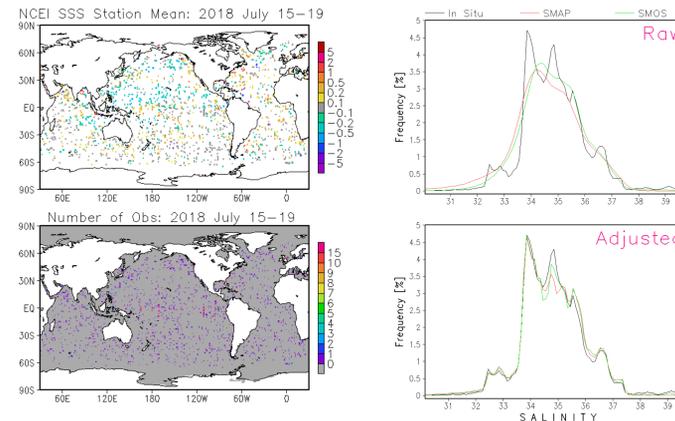
A analysis of observation-based global oceanic data, comprising data sets of global sea-surface salinity (SSS) and associated freshwater fluxes (precipitation (P) and evaporation (E)), is developed at the NOAA Climate Prediction Center (CPC) for real-time monitoring of SSS variations. The Blended Analysis of SSS (BASS), at monthly and pentad temporal resolution, are developed through blending *in-situ* measurements from the NOAA National Center for Environmental Information (NCEI), retrievals from the European Space Agency's (ESA) Soil Moisture - Ocean Salinity (SMOS) mission, the joint U.S. and Argentinian Aquarius mission, and the National Aeronautics and Space Administration's (NASA) Soil Moisture Active-Passive (SMAP) mission.

## BASS Pentad SSS System



## ALGORITHM

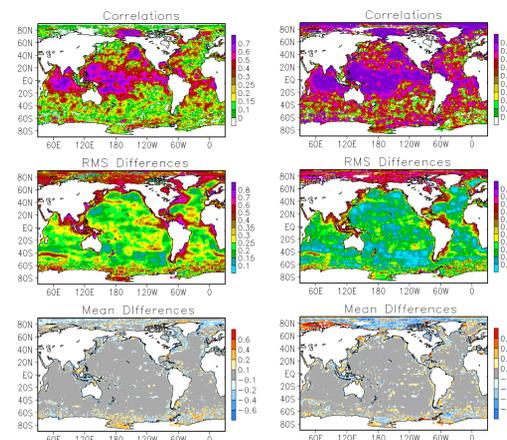
**Step 1:** Removing the bias in the satellite data through matching the Probability Density Function (PDF) against co-located *in-situ* measurements. **Step 2:** Combining the bias-corrected satellite data with the *in situ* measurements through Optimal Interpolation (OI).



**Figure 1** (left): 5-day mean in-situ SSS from July 15 -19 2018 at 1° latitude/longitude grid box (top) with the corresponding number of observations (bottom). The data is provided by NOAA/NCEI. **Figure 2** (right): Probability density function (PDF, %) of 5-day mean SSS at 1° latitude/longitude grid box over the global ocean for the NCEI in-situ measurements (black), SMAP (red) and SMOS (green) satellite retrievals.

## VALIDATION

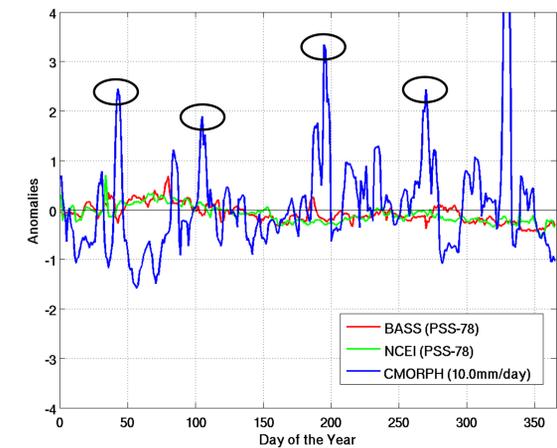
### Comparison between BASS and NCEI analysis



**Figure 3:** Comparison between BASS Pentad SSS and NCEI analysis (left): correlation (top), RMSD (middle), and mean differences (bottom); comparison between BASS monthly SSS and NCEI analysis (right): correlation (top), RMSD (middle), and mean differences (bottom). The comparison was from 2016 to 2019.

## VALIDATION

### Comparison of time series of BASS, NCEI analysis, and CMORPH

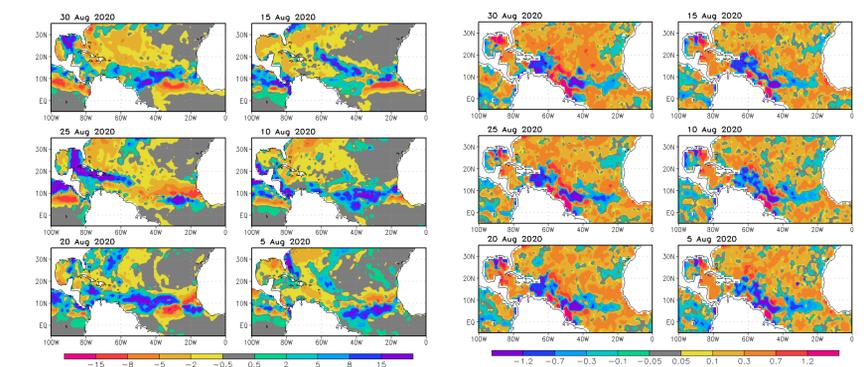


**Figure 4:** Daily (5-day mean) SSS anomalies of BASS pentad SSS and NCEI analysis, and precipitation anomalies of CMORPH V1.0 for year 2019 at 169.5°E and 11.5°S

## APPLICATION

### Precipitation Anomaly

### SSS Anomaly



**Figure 5:** Maps of 5-day mean precipitation (CMORPH) and SSS (BASS) anomalies in August 2020.

## ACKNOWLEDGMENTS

This is a joint collaboration of NOAA/NCEP/CPC, NOAA/NESDIS/NCEI, and NOAA/NESDIS/STAR. The data is available at <https://ftp.cpc.ncep.noaa.gov/precip/BASS/>