

Global Historical Ocean Salinity Reconstruction

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1. What we want to do?

- **Reconstruct** the global historical near-Sea Surface Salinity (SSS);
- **Study** inter-annual, decadal and long-term salinity variations;
- **Evaluate** climate model ocean salinity simulations.

2. Why we want to do it?

Ocean salinity is linked to the **global water cycle** and is a critical driver of **ocean processes** and **climate variability**.

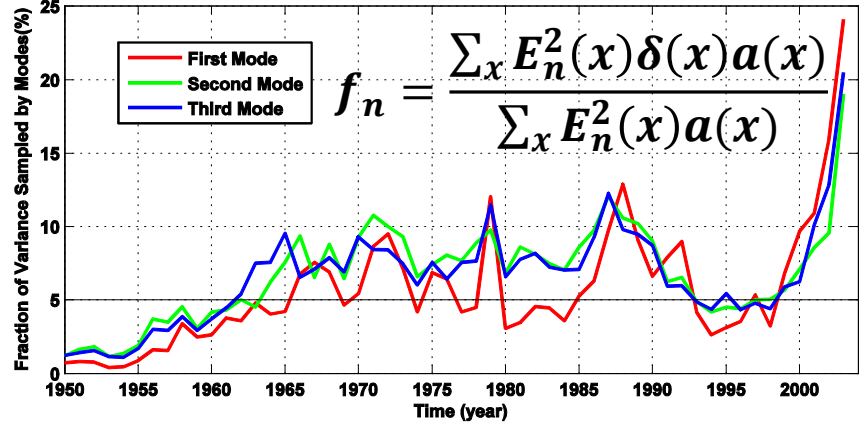
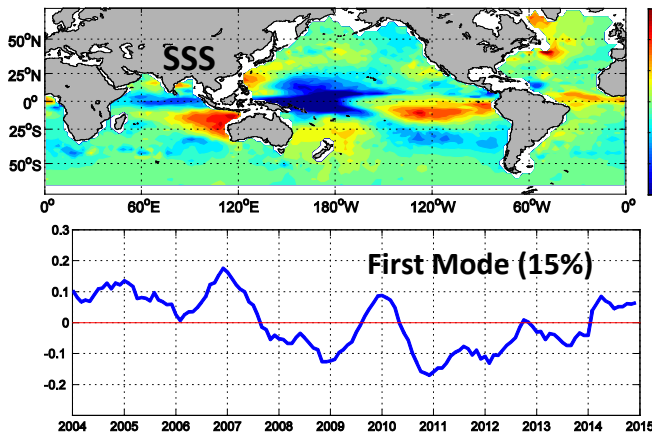
Modern data: Argo  and Satellites



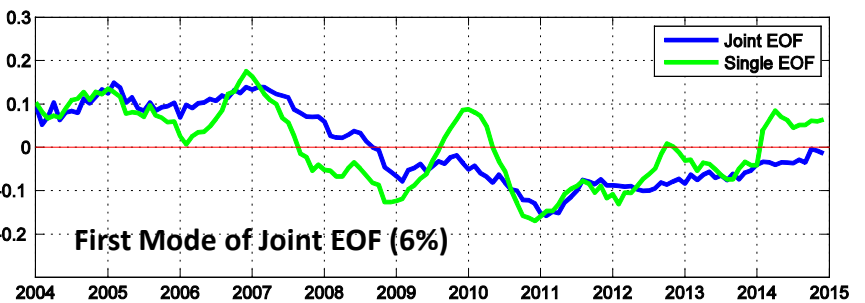
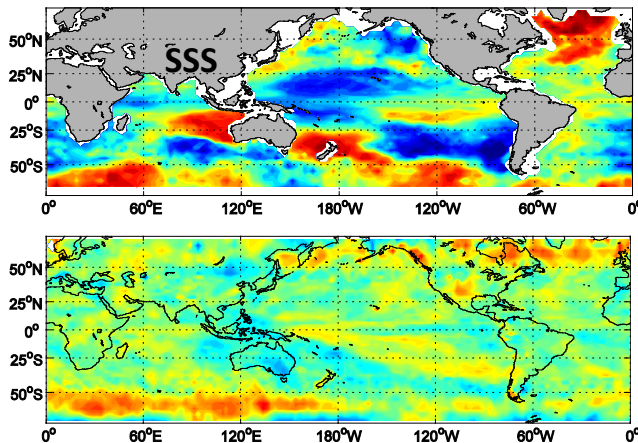
Historical data: World Ocean Database (WOD) 2013 (NODC)

3. How we plan to do it?

Exp. A: SSS



Exp. B: SSS & Precipitation



1st mode time series correlation: 0.79
 1st mode EOF of SSS correlation: 0.59

4. What benefits could accrue? using 40 or 105 years SSS data set

- Improving Durack & Wijffel (2012)'s work: EOF-based analysis could be better than linear interpolation; precipitation information should improve SSS in some places; satellite data will improve the sampling resolution;
- Studying global salinity variation characteristics and mechanisms, including detailed spatial and temporal structure on the time scales of inter-annual (ENSO), decadal and long-term trend;
- Evaluating ocean salinity simulations and providing guidance for adjustment of climate model simulations;
- Improving ocean modeling by assimilating historical ocean salinity.

Recent relevant references:

Ren, L. et al. (2013), Global precipitation trends in 1900–2005 from a reconstruction and coupled model simulations.

Smith, T. et al. (2012), Improved reconstruction of global precipitation since 1900.