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**

- **EOFs of modern SSS**
- **Fit Historical Data to EOFs**
- **Reconstruct SSS (sum of EOF modes)**

First Mode (15%)

1st mode time series correlation: 0.79

1st mode EOF of SSS correlation: 0.59

**Exp. B: SSS & Precipitation**

- **Joint EOFs of SSS and Precipitation**
- **Fit Historical Data to EOFs**
- **Reconstruct SSS (sum of EOF modes)**

First Mode of Joint EOF (6%)
4. What benefits could accrue?

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