Low Frequency Variations in Global Mean Sea Level: 1950-2000

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1. Measuring Sea Level

- Measuring sea level at a few locations
- Very long records (≥ 50 years)
- Long-term MSL rate

2. EOF Reconstruction

\[ \hat{\Delta h}(x, y, t) = \sum_{n=0}^{N} X_n(x, y) W_n(t) \]

3. Data Processing

- Monthly data from Permanent Service for Mean Sea Level (PSMSL) through December 1998
- Revised Local Reference (RLR) data - data corrected to common datum at each site
- TOPEX altimeter data with standard corrections

4. Verification of TGR GMSL

- GMSL from tide gauge reconstruction (TGR) compared to T/P
- Geocat GMSL

5. 1950-1993

- Use Southern Oscillation Index (SOI) as proxy for El Niño/La Niña

6. 1982-1998

- Error for 5-year GMSL estimated to be about half this

7. 1950-1998

- Estimate error in GMSL from TGR (1-year filter) to be
  - ± 2 mm (1980 - present)
  - ± 5 mm (1950-1980)

8. Statistics

- Decadal MSL rate, annual, interannual
- Short records (< 10 years)
- Very long records (> 50+ years)
- Measures sea level globally
- Measure sea level at a few locations
- Measures sea level globally

9. Low Frequency GMSL (w/ Error Bars)

10. GMSL and ENSO

- The Southern Oscillation Index (SOI) as proxy for El Niño/La Niña

11. GMSL and PDO

- Variations correlated with most El Niño/Southern Oscillation events and Pacific Decadal Oscillation

12. Conclusions

- Low frequency global mean sea level (GMSL) variations can be determined from tide gauge data and altimeter EOF modes with an accuracy of 2-4 mm to 1950
- Significant changes in low-frequency and interannual GMSL as far back as 1950