A point-wise least squares spectral analysis of the Caspian Sea level fluctuations, using Topex/Poseidon and Jason-1 observations

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Introduction and Motivation

- The Caspian Sea is the world's largest inland water body.
- Caspian displays considerable fluctuations in its water level.
- Caspian’s level change is not homogenous due to
  - The influence of the Volga River’s discharge
  - The variety of climate conditions within different regions of the sea

These necessitate to look at the various regions of the Caspian Sea, instead of treating it as a whole.
• Building 280 SSH time series

SSH = satellite position – (corrected ranges)

Corrections e.g., tidal; dry tropospheric; wet tropospheric; and inverse barometric corrections should be applied with cares!

We did not correct the time series for tides!
Sample Time Series

Spectral Analysis

Level height (m)

Time [year]

-27.5 to -26


Northern-most point

Middle point

Southern-most point
Tidal Patterns

Amplitude of M2

Amplitude of S2

Phase of M2

Phase of S2

Introduction
Motivation
Setup
Method
Results
Discussions

6 December 2012
Comparison with Tide Gauges

- Correlation: 0.86
  - Anzali gauge
  - T/P
  - Jason1

- Correlation: 0.82
  - Neka gauge
  - Altimetry

- Correlation: 0.76
  - Noshahr gauge
  - Altimetry
PCA of SSH Time Series

Spatial pattern of PC 1 (EOF 1)

Temporal pattern of PC 1
Impact of Volga

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