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

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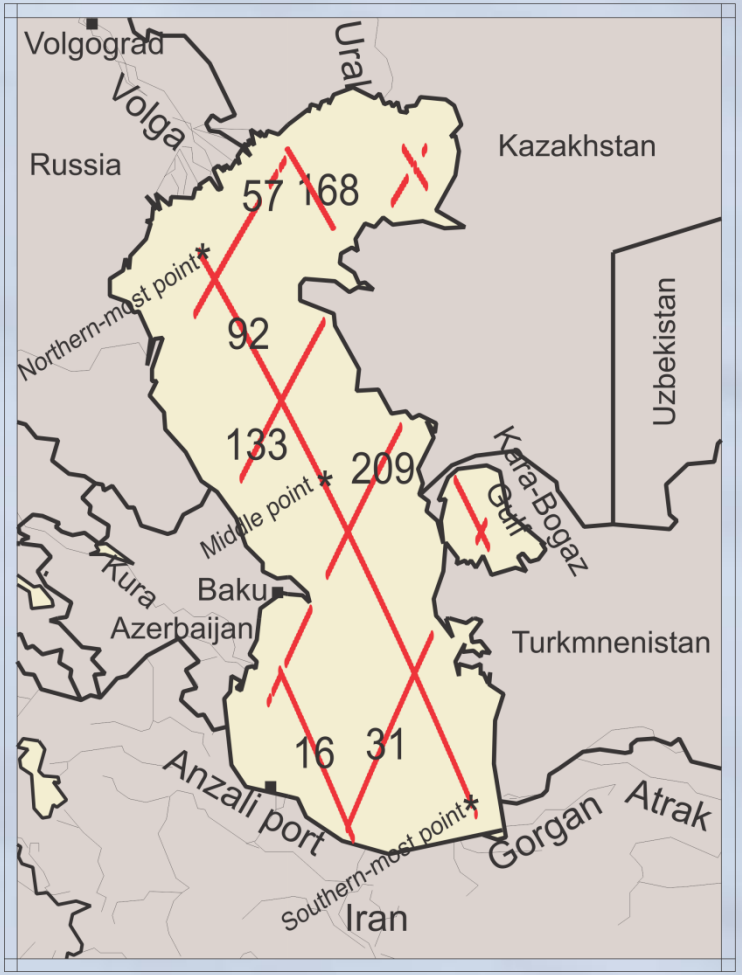
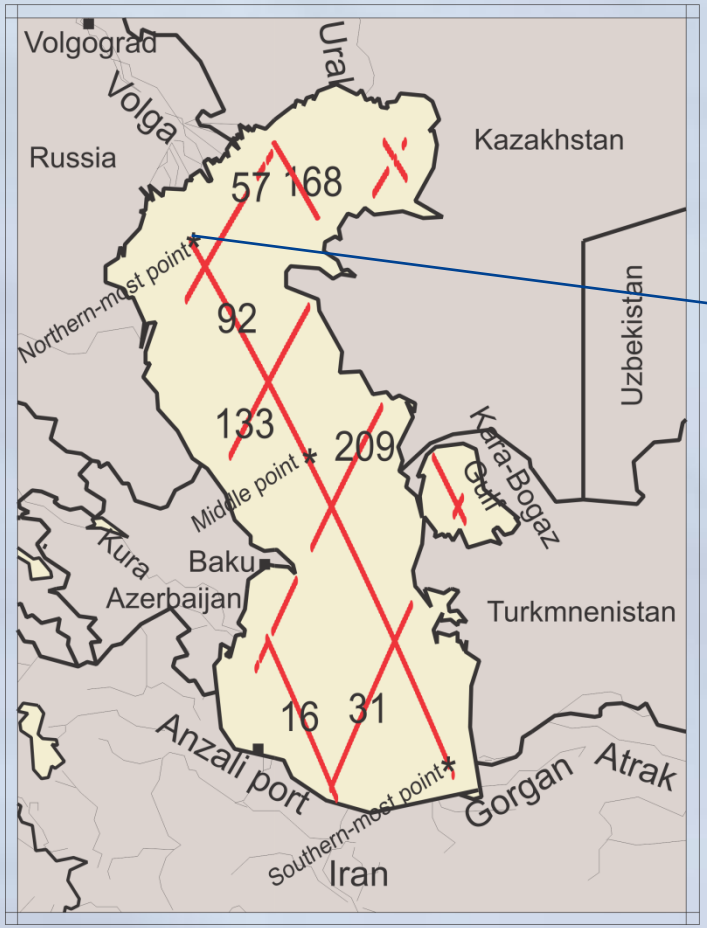
Introduction and Motivation

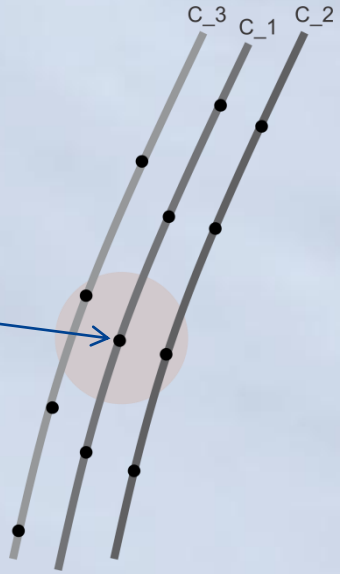
- The Caspian Sea is the world's largest inland water body.
- Caspian displays considerable fluctuations in its water level.
- Caspian's level change is not homogenous due to
  - The influence of the Volga River 's discharge
  - The variety of climate conditions within different regions of the sea

⇨ These necessitate to look at the various regions of the Caspian Sea, instead of treating it as a whole.



SSH Time Series





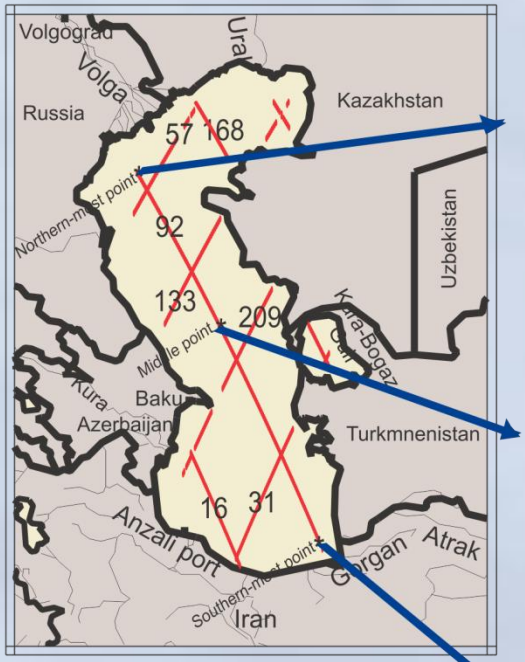
- Building 280 SSH time series

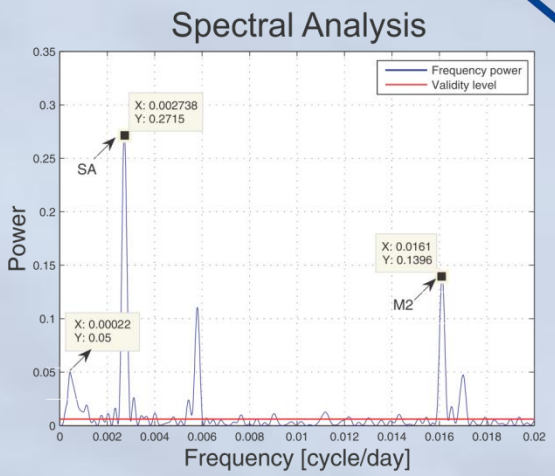
SSH = satellite position – (corrected ranges)

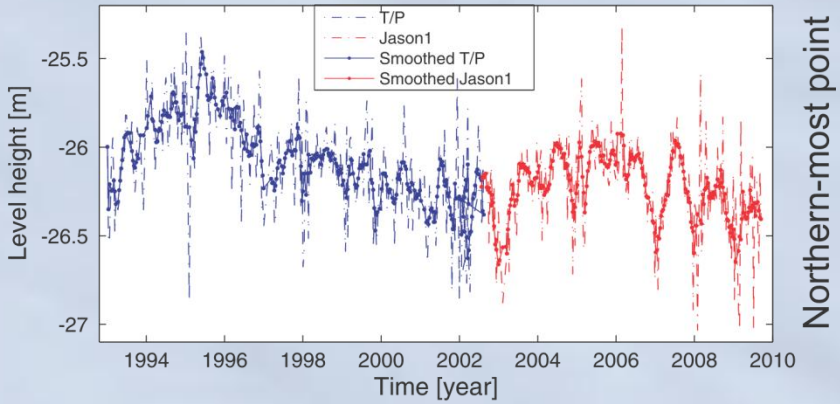
Corrections e.g., tidal; dry tropospheric; wet tropospheric; and inverse barometric corrections should be applied with cares!

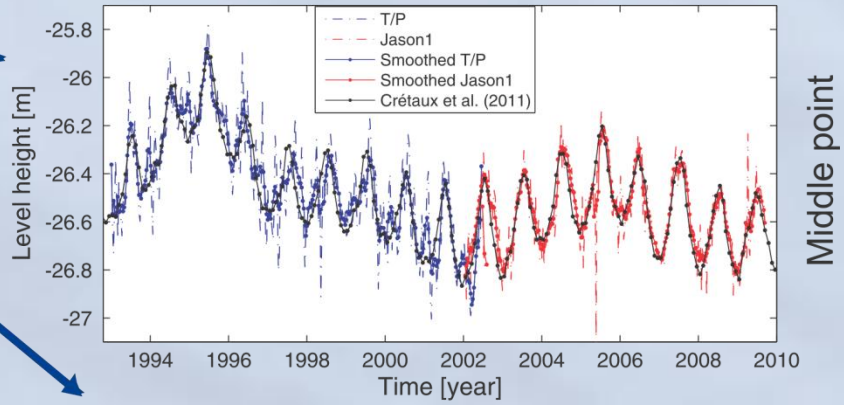
We did not correct the time series for tides!

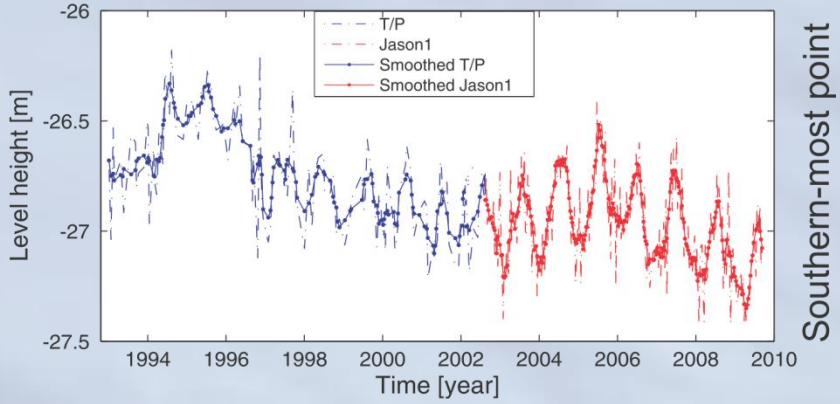
Sample Time Series



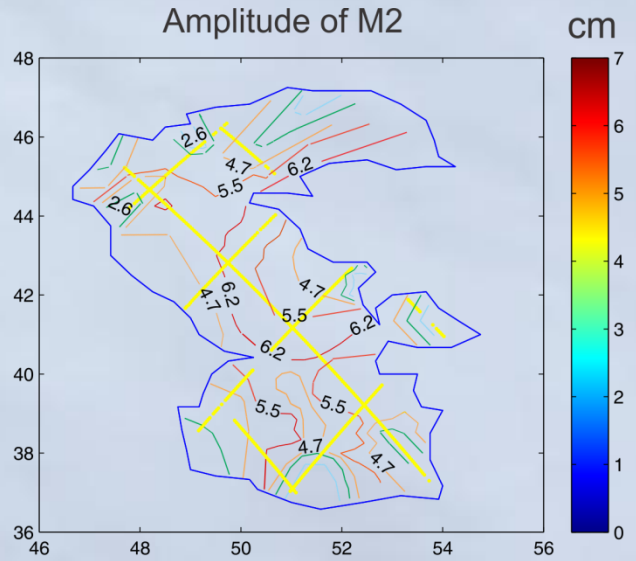


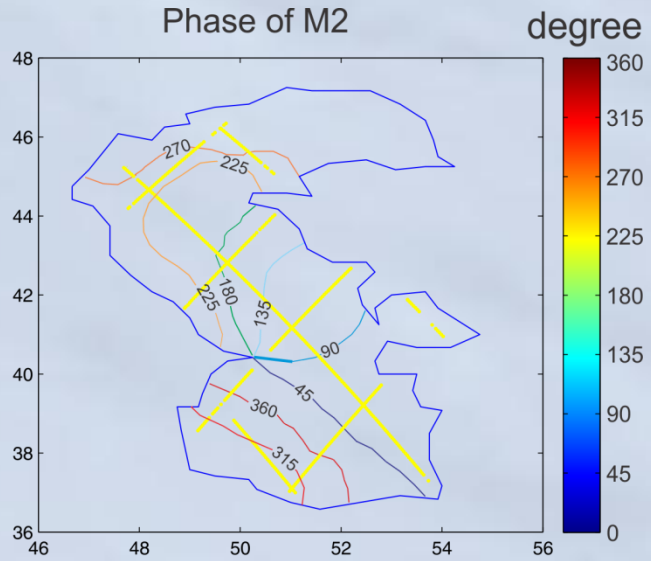


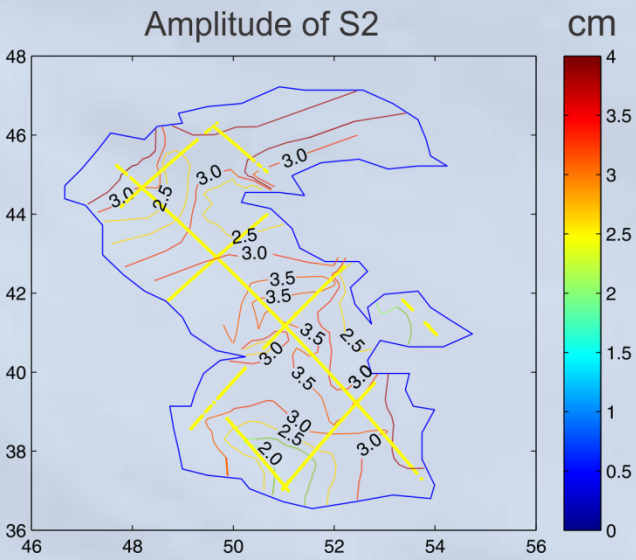


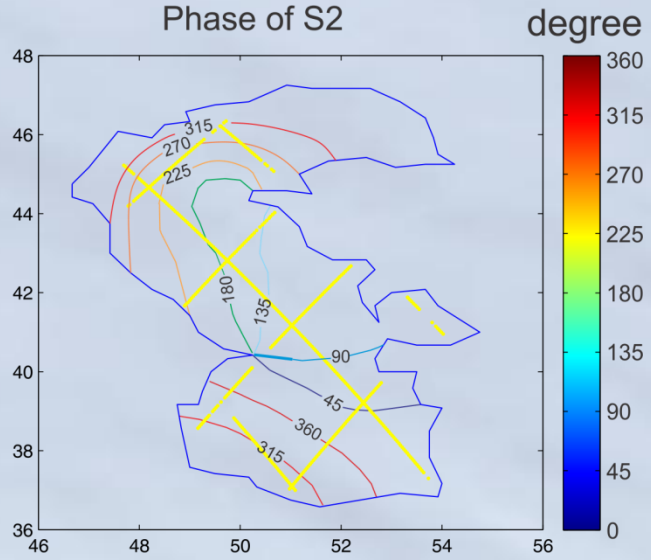


Tidal Patterns

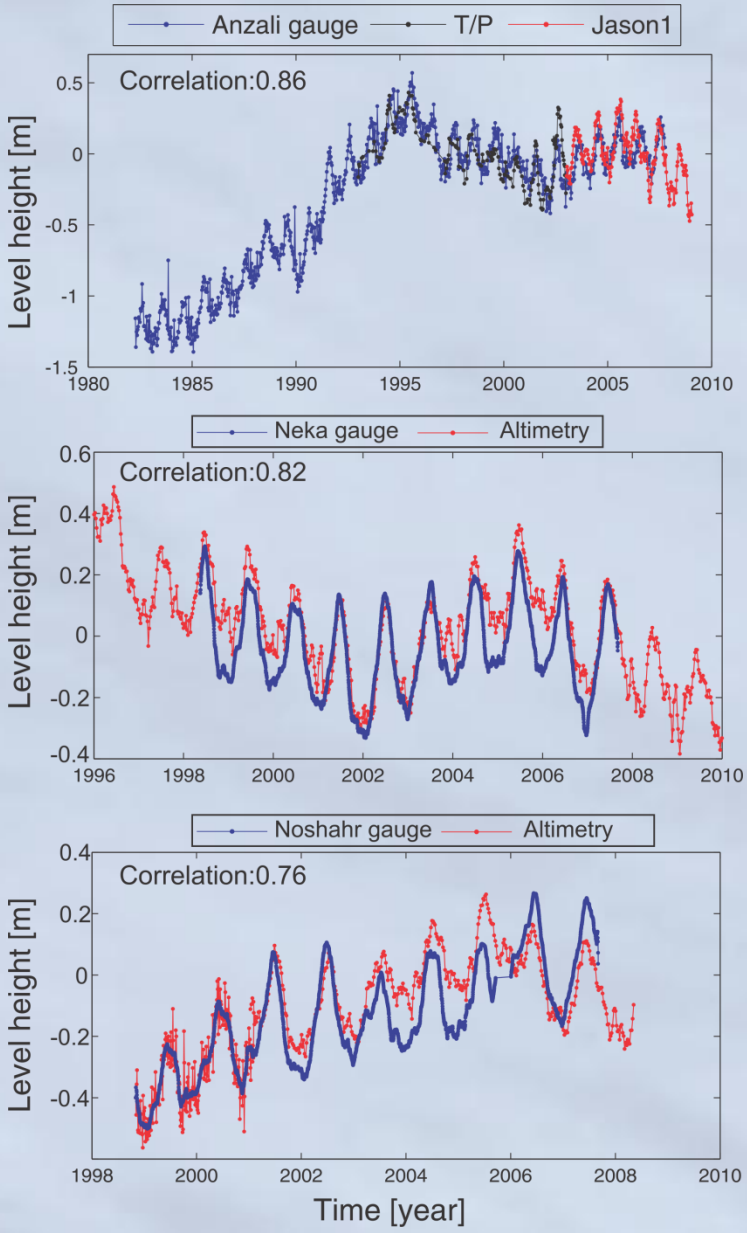




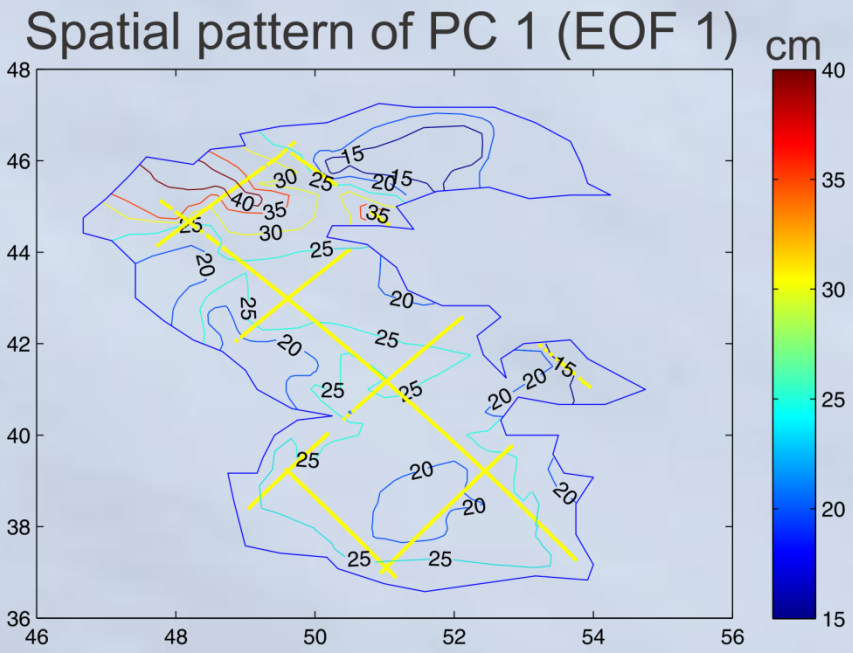


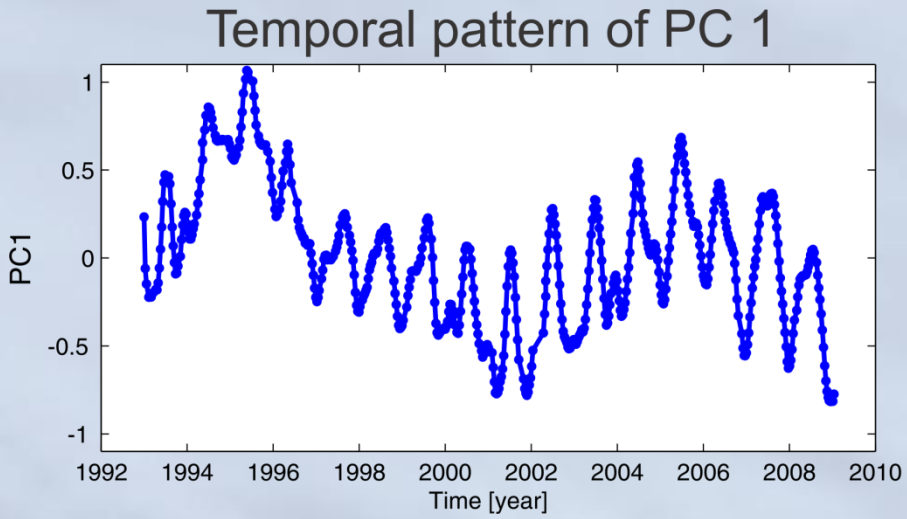


Comparison with Tide Gauges

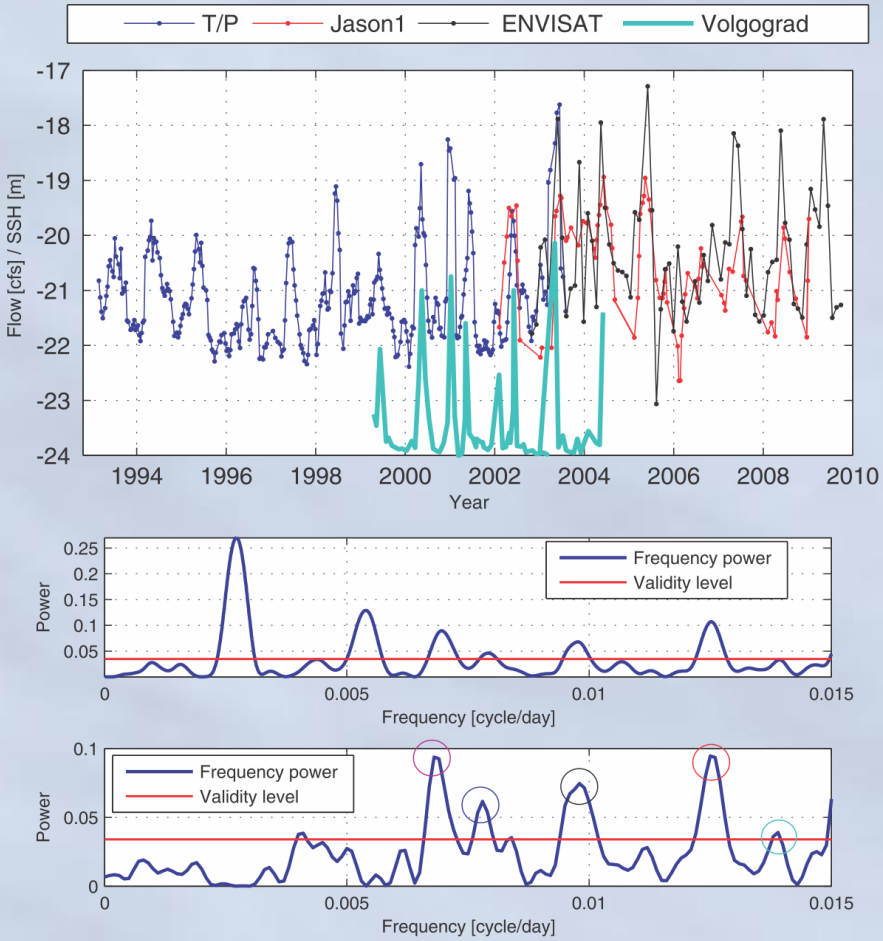


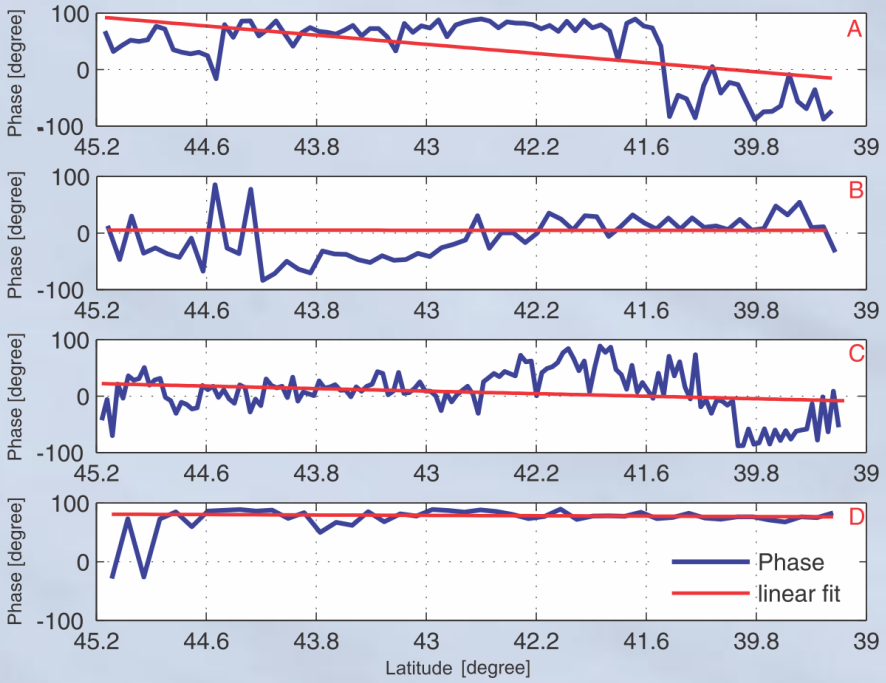
PCA of SSH Time Series





Impact of Volga





Reference: M.A. Sharifi; E. Forootan; M. Nikkhoo; J. Awange; M. Najafi (2013). A point-wise least squares spectral analysis (LSSA) of the Caspian Sea level fluctuations, using Topex/Poseidon and Jason-1 observations. Journal of Advances in Space Research, Vol.51 (1), Page 858-873 dx.doi.org/10.1016/j.asr.2012.10.001