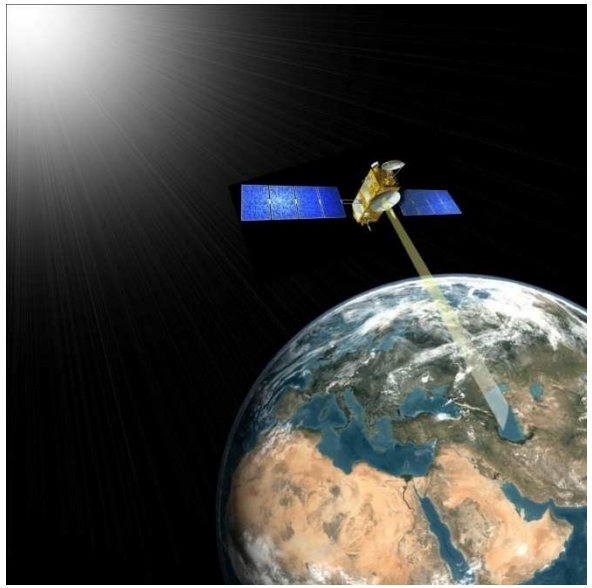
SATELLITE ALTIMETRY TO SUPPORT STUDIES OF SEA LEVEL CHANGE IN THE CASPIAN SEA



Presented by

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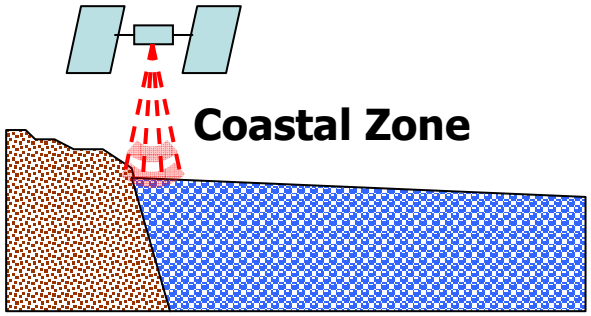
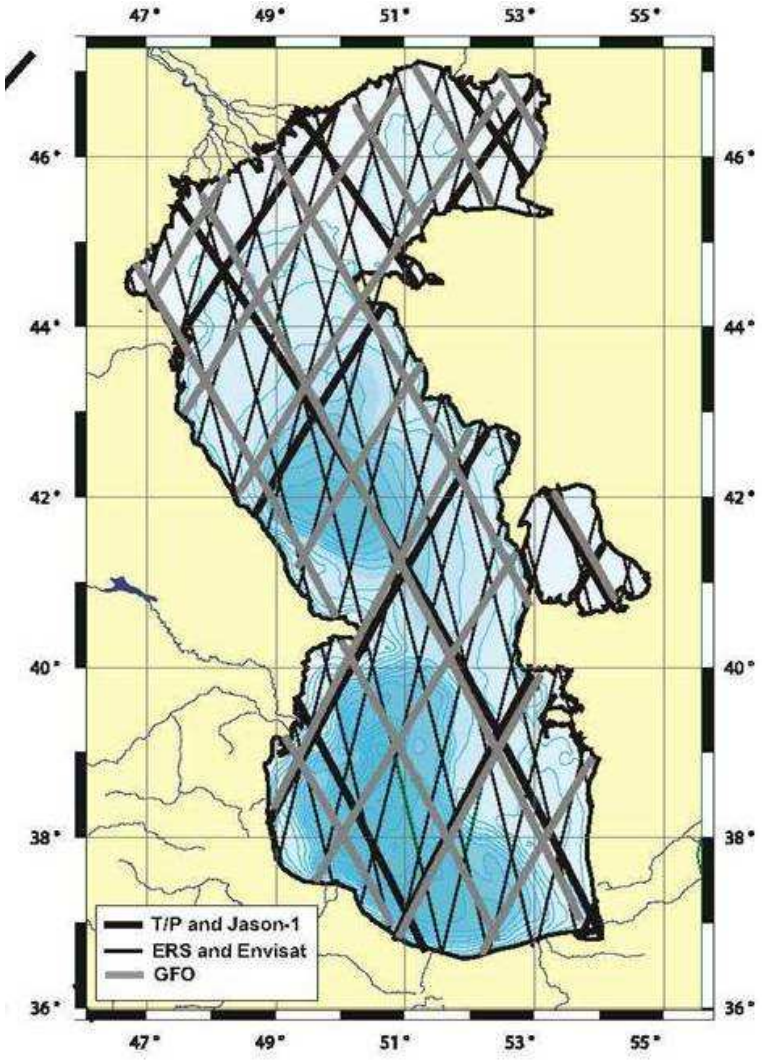
Satellite altimetry in few words



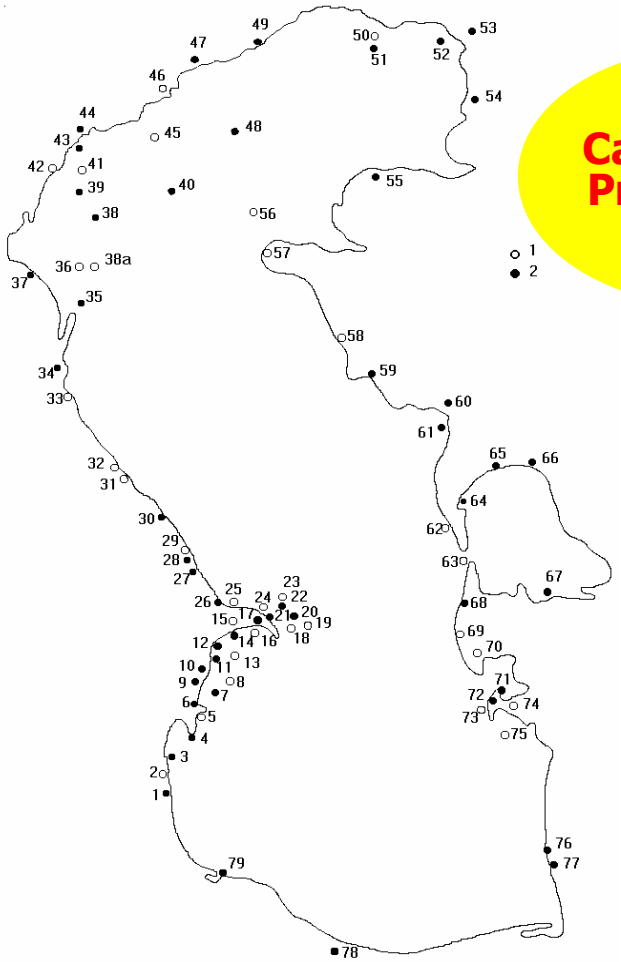
- A space borne tide gauge
- To monitor sea level changes
- 18 yrs multi-mission archive
- A success story in open ocean
- Now working to get more and better data in inland seas
- Caspian Sea proposed as laboratory for calibration/validation
- Progresses in technology promise better resolution capability
- Developing capacity in inland sea altimetry in Caspian countries is a priority



Caspian Sea – In situ sea level infrastructure

- **Concerns:**
  - Where are data located?
  - In what quantity?
  - Of what quality?
  - Who owns data?
  - How to access?

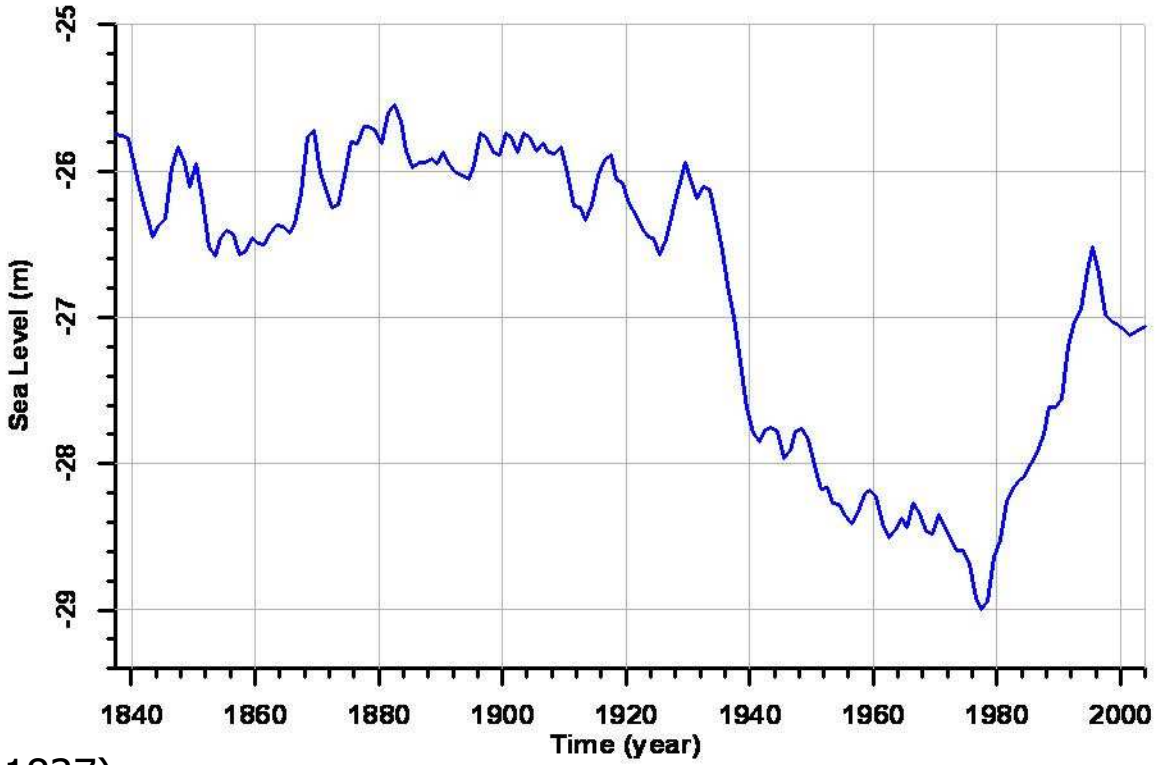
- **What we have seen:**
  - Different sampling
  - Manual recording
  - Often gappy or collection stopped
  - Just tables (no metadata)
  - Language differences
    - Jiloy, Zhiloy, Chilov – same station!!!



Source: Caspian Env Programme 1999

BUT ….the quality and usability of the altimeter-derived observations is dependent upon good calibration/validation of the satellite sensors with in situ observations.

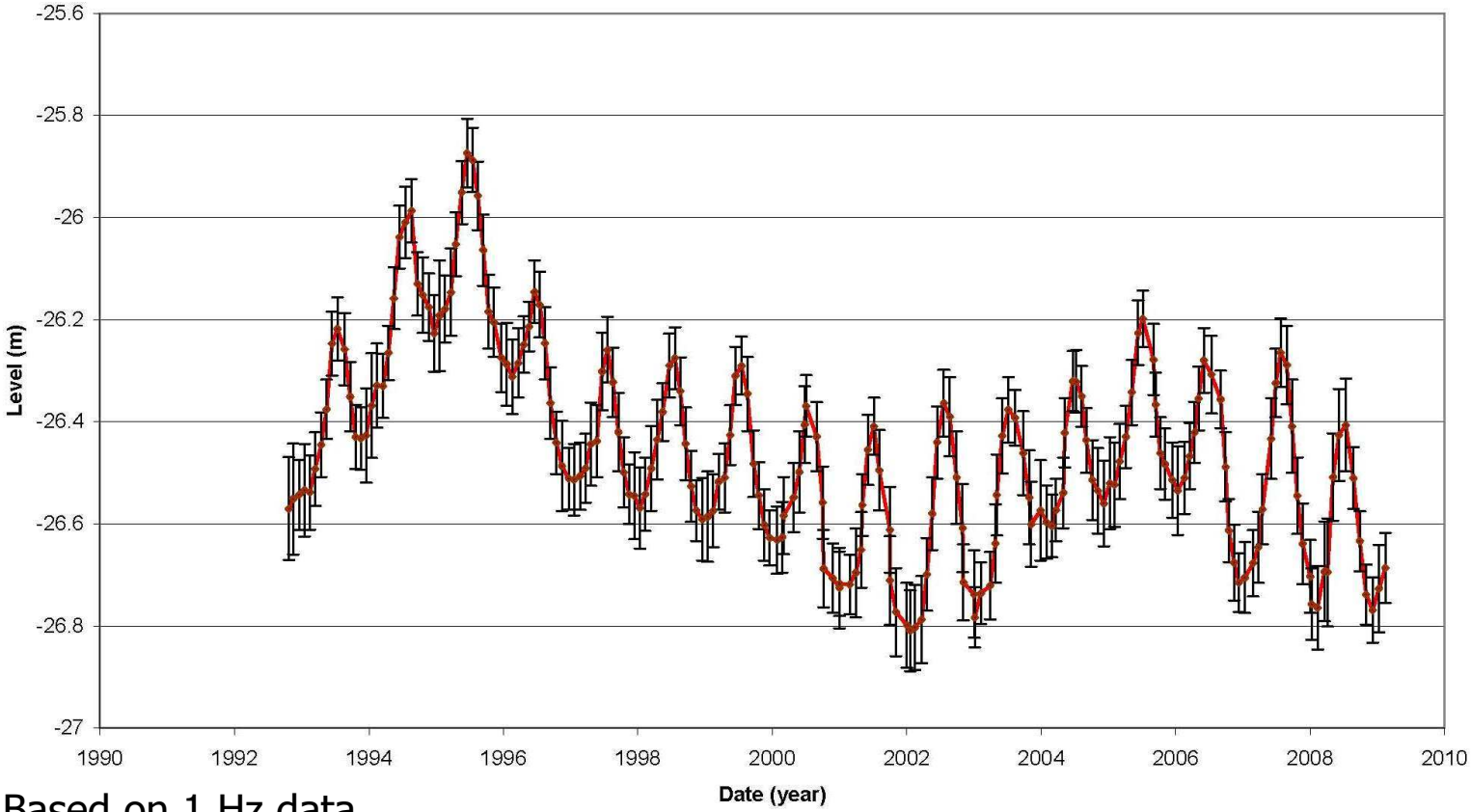
Caspian Sea – Water level variability from in situ data



- Longest record at Baku (since 1837)
- Shows a rising of more than 2 metres between 1977 and 1995
- Now stabilized near the −27 m level
- Understanding variability at all scales – a complicated puzzle
- Combination of factors: climatic (atmospheric variations), anthropogenic (e.g. river drainage and water use, especially Volga), geologic (e.g. subsidence)

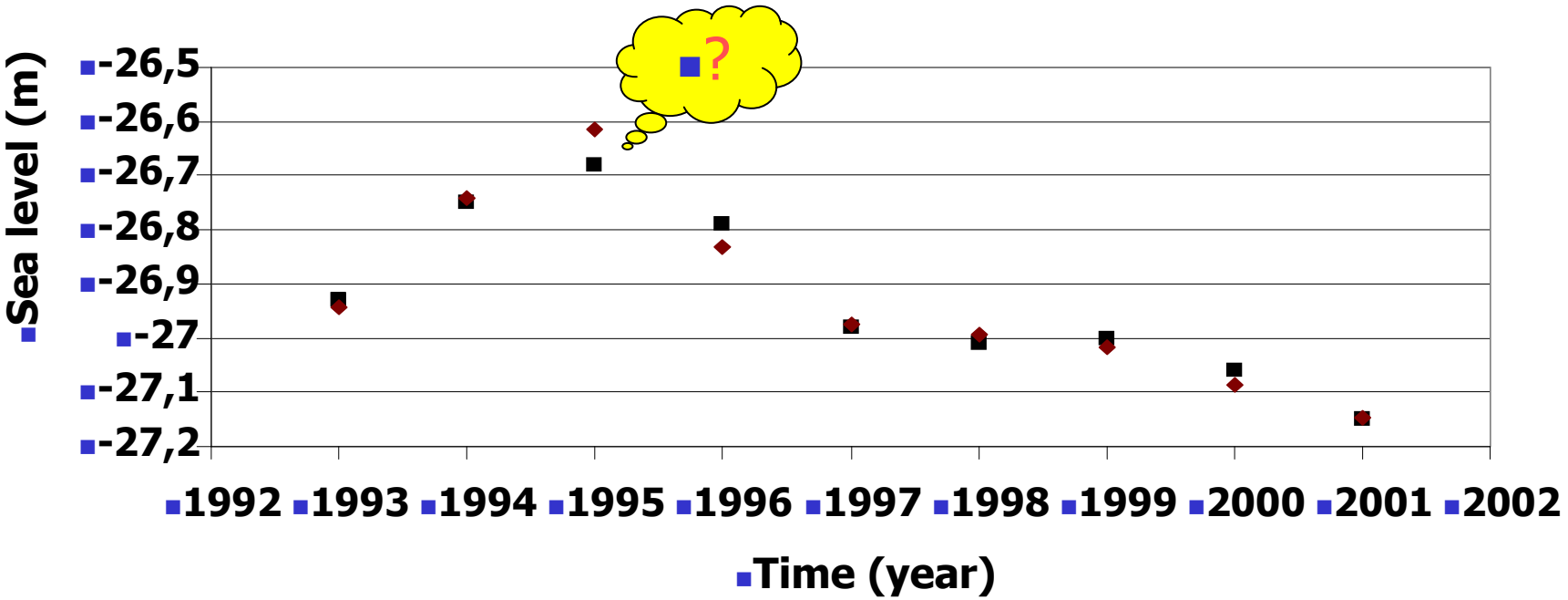
Will the Caspian sea level rise again?

Caspian Sea – Water level variability from multi-mission altimetry



- Based on 1 Hz data
- Referred to Baltic Sea level reference frame
- Shows seasonal variations probably due to climatological (evaporation & precipitation) and hydrological (river runoff, discharge to Kara Bogaz Gol) cycle
- Inter-annual tendencies might be interpreted in the light of decadal climate variability and amplification of irrigation in the Volga river basin

Caspian Sea – Comparison of TOPEX/Poseidon altimetry (red) and in situ stations (black)

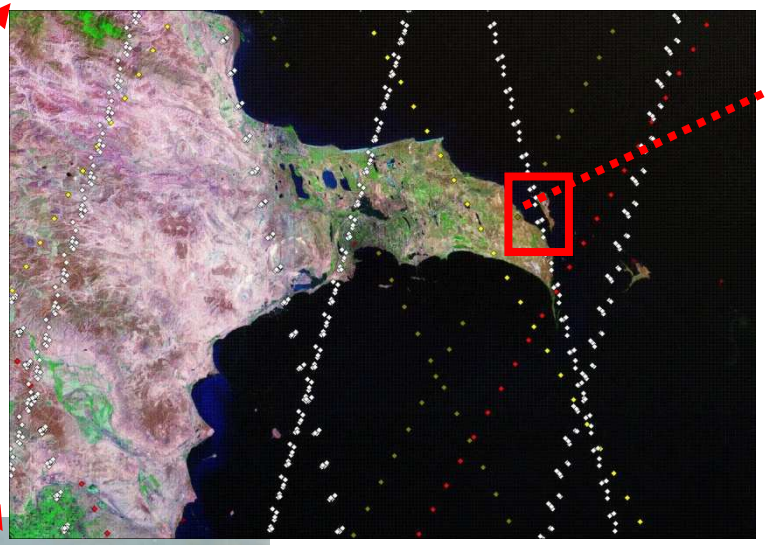


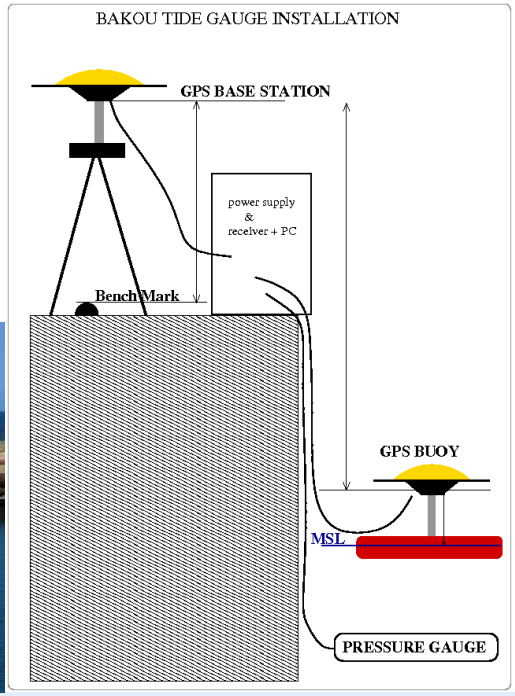
- Agree well with "ground truth" at basin scale, but still some local « mysteries » (e.g. 70 mm in 1995)
- Errors in altimetry ~15 mm/yr
- Possible uncertainty in the global lake level deduced from in situ stations

Need of a permanent Cal/Val site for satellite altimetry

Sea level pilot station operating at Absheron Port (Baku)

- Satellite altimetry ground tracks
- Jason (red), Envisat (white), GFO (green), T/P 2002-2005 (yellow)





Some pictures about field work in June 2008

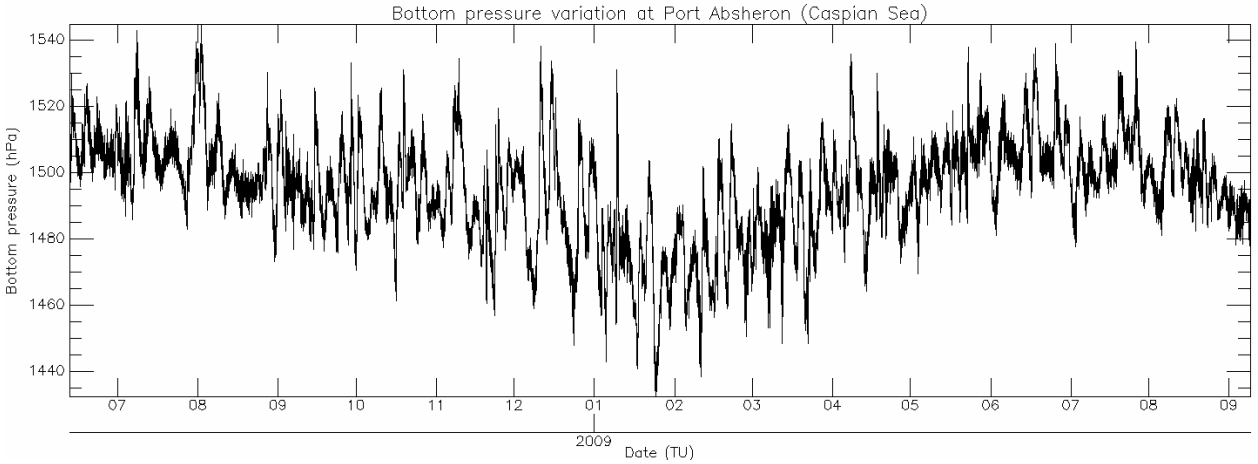


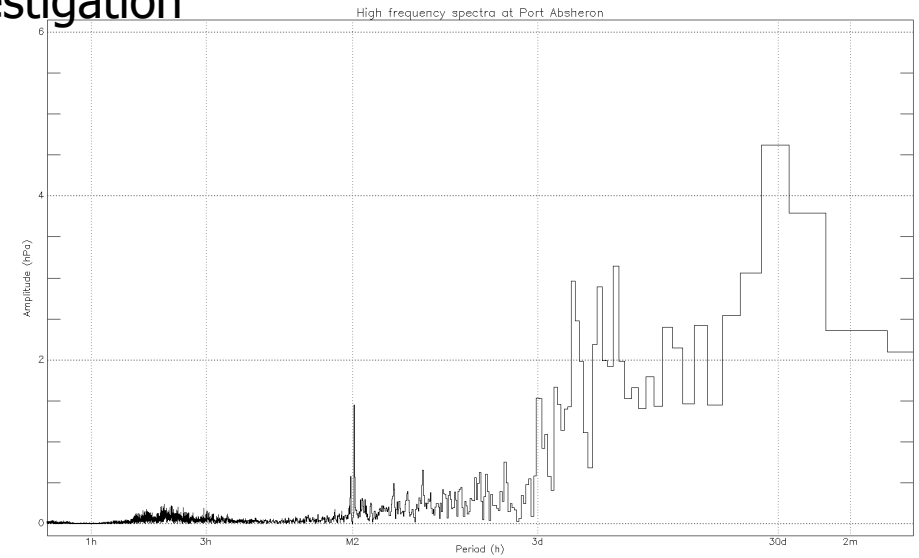



- Started to collect data in June 2008 and still ongoing
- Processed the first year
- Work in progress …..

Sea level variability at Absheron Port

- During the observational period, the sea level at Port Absheron exhibits a large high frequency variability apparently more pronounced during summer time as well as an annual cycle.
- There are also other oscillations superimposed that need careful investigation





- The spectrum analysis shows the existence of a little tidal contribution to the sea level
- The large contribution is observed in the 3-30 day band, possibly linked to the meteorological forcing

Summary

- To be filled at end

Bottom-up message