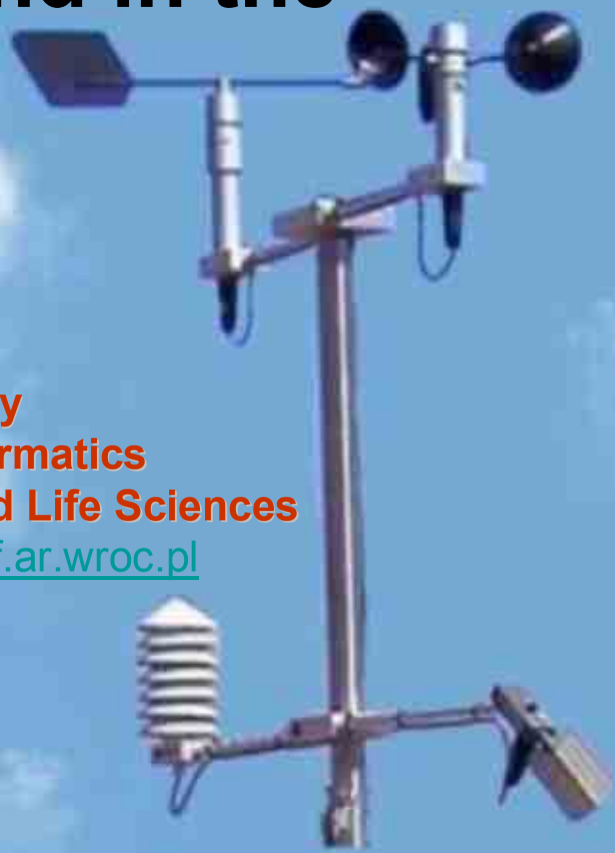
The tropospheric delay estimation for EPN/IGS permanent stations located in the Sudety Mountains and in the adjacent areas.



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GPS meteorology: MHES Grant

Aim:

- Use of the GPS observation to build the spatio –temporal (4D) troposphere tomography model on the Sudety Mountains.

Data sources:

- meteorological parameters,
- GPS observations.

Products:

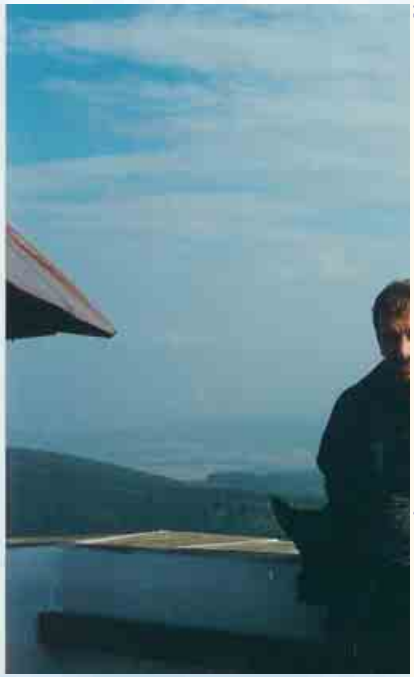
- Spatial and temporal distribution of water vapour in the troposphere over GPS network.

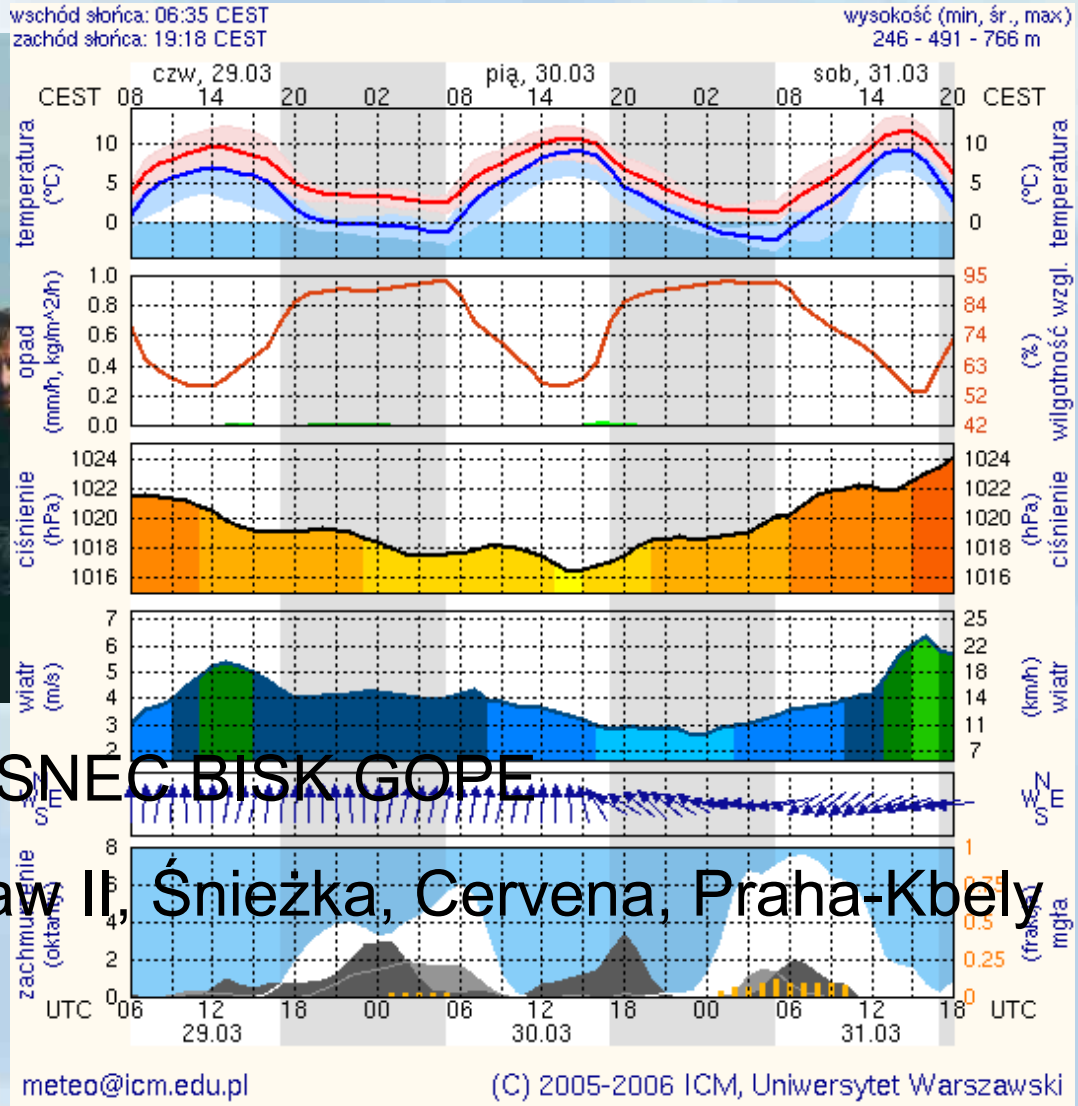
GPS Meteoreology: Stage I

- Meteorological data realiability assesment
- Meteorological GPT model accuracy assessment
- Evaluation of EPN ZTD product as a proper reference for the Sudety subnetwork.

Meteorological parameters

- T tempe
- p pressu
- h humid





GPS stations: WROC SNEC BISK GOPE

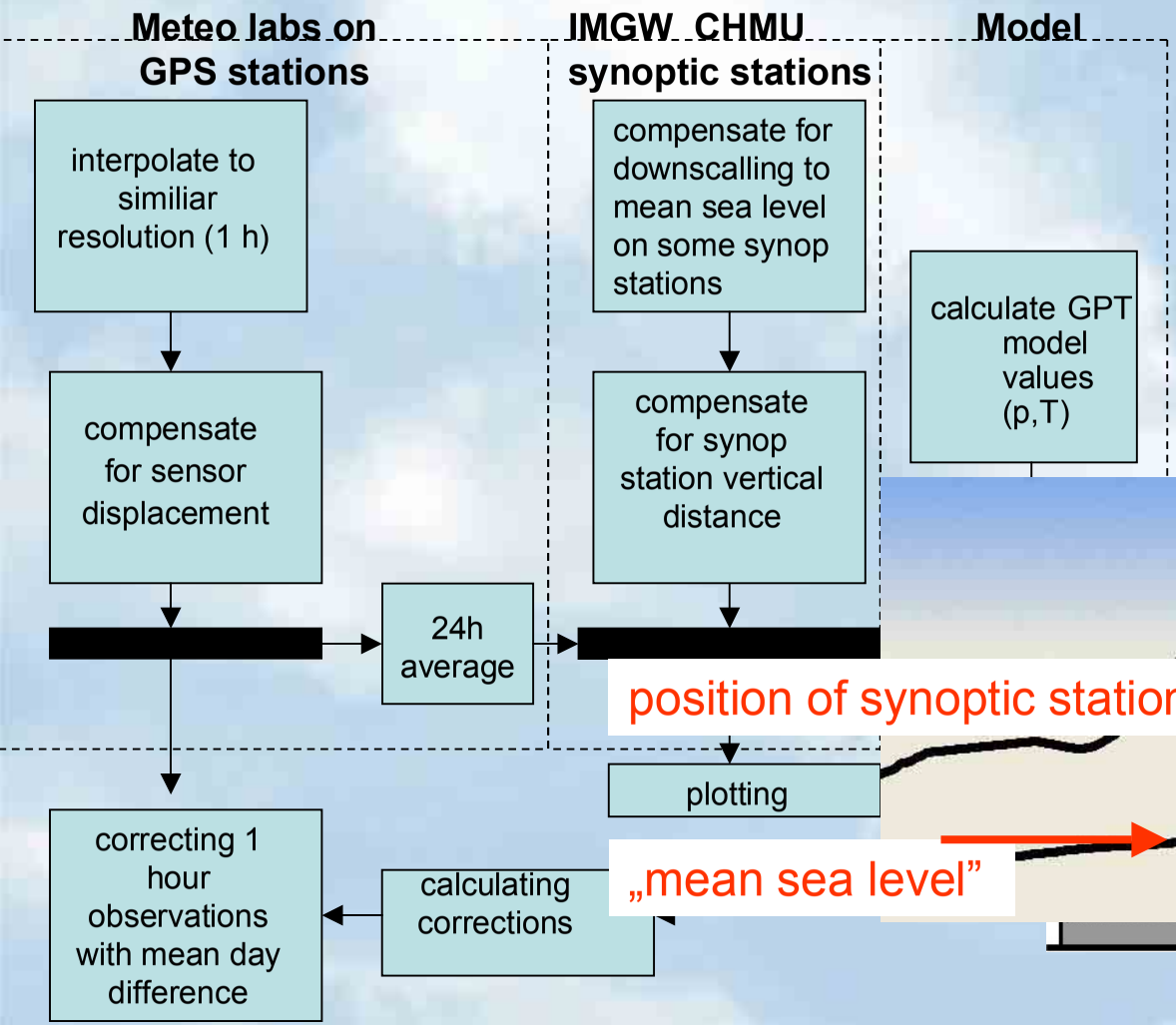
Meteo stations: Wroclaw II, Śnieżka, Cervena, Praha-Kbely

Period: year 2006

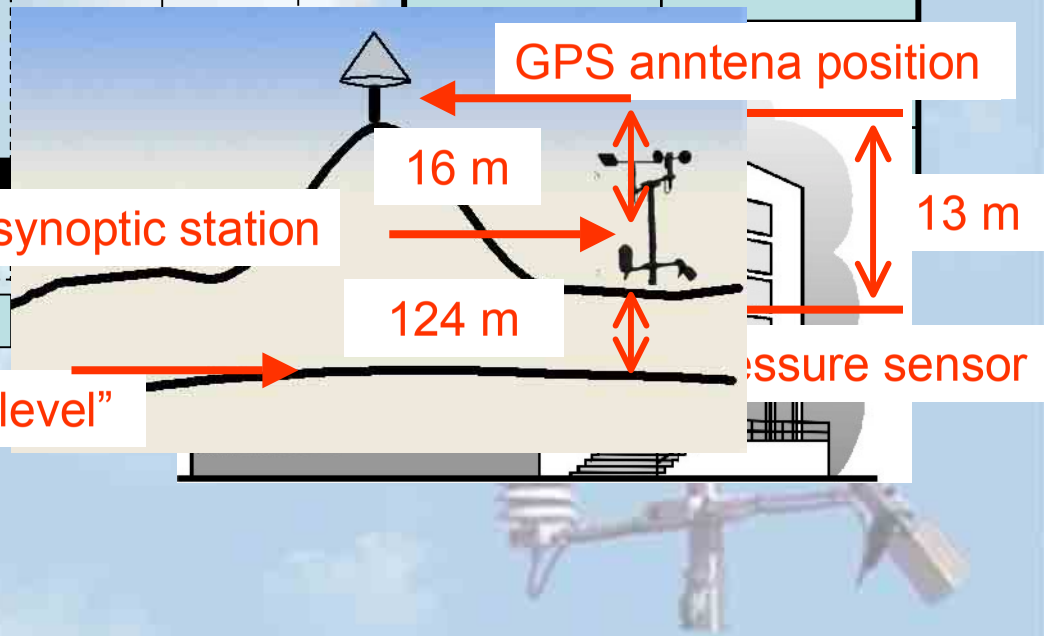
Meteorological parameters: Sources

- meteo packs mounted close to GPS antenna
  - pressure: 0.3 – 0.5 hPa
  - temperature: 0.3 – 0.5 ^{0}C
  - humidity: 3 - 5%
- Polish Meteorological Service (IMGW) and Czech Hydrometeorological Institute (CHMI)
  - pressure: 0.2 hPa
  - temperature: 0.2 ^{0}C
  - humidity: 2%
- GPT model
  - pressure: 5 hPa
  - temperature: 3 ^{0}C

Meteorological parameters:
data interpolation comparison and calibration

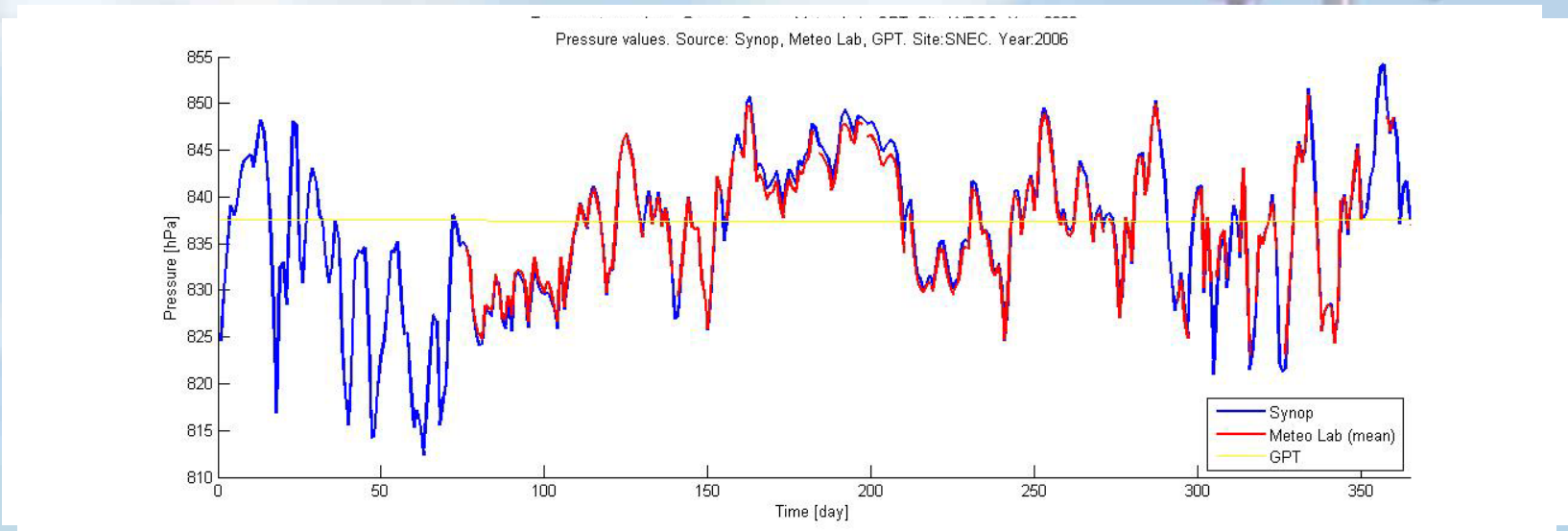


Station	meteo files time resolution [s]
WROC	300
GOPE	60



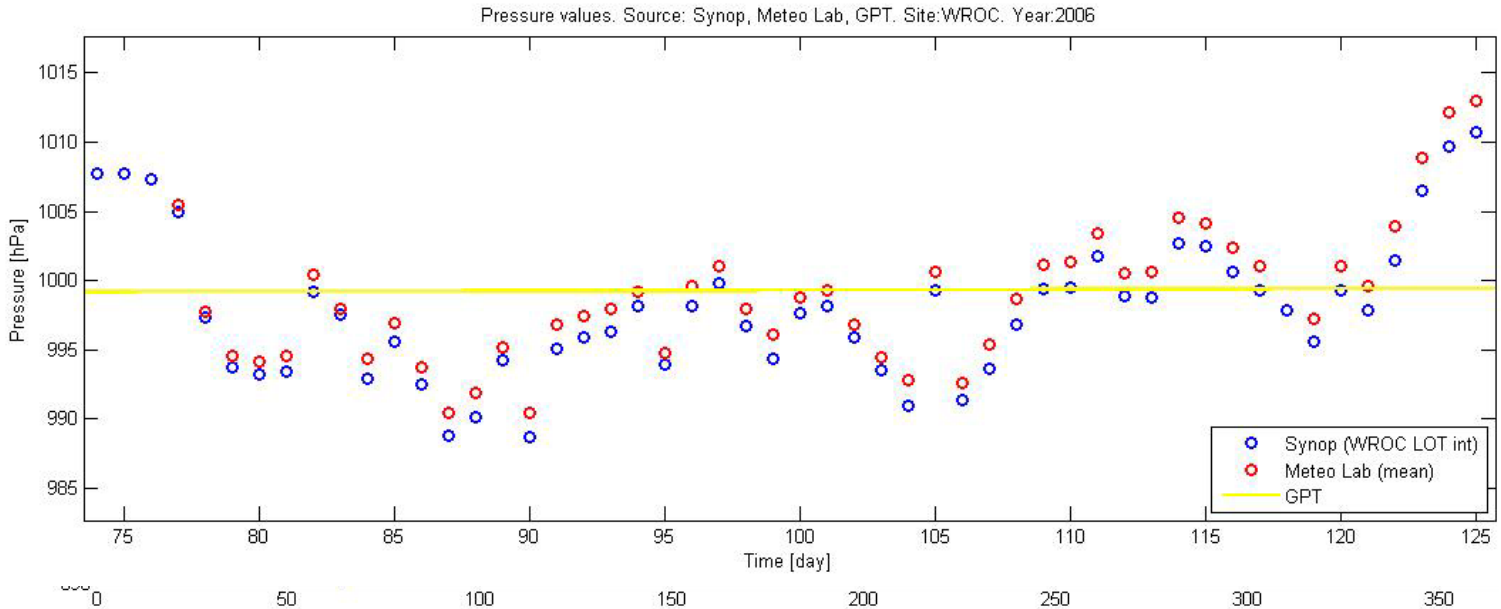
Meteorological parameters: Results

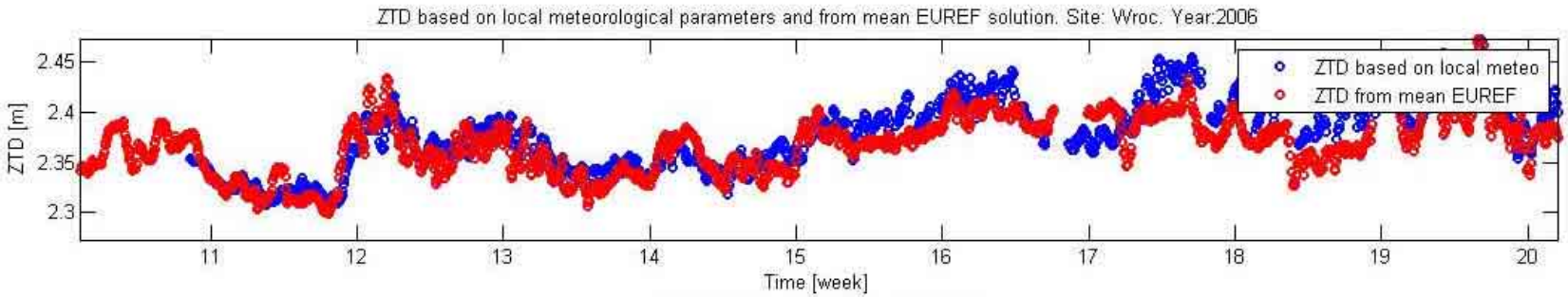
Station	pressure [hPa]		temperature [^{0}C]	
	bias	error	bias	error
WROC	0.94	0.40	0.74	0.60
GOPE	-0.53	5.02	-2.98	2.80
SNEC	-0,07	0.40	0.21	0.38
BISK	24.37	6.14	-1.03	4.20



Meteorological parameters: Problems

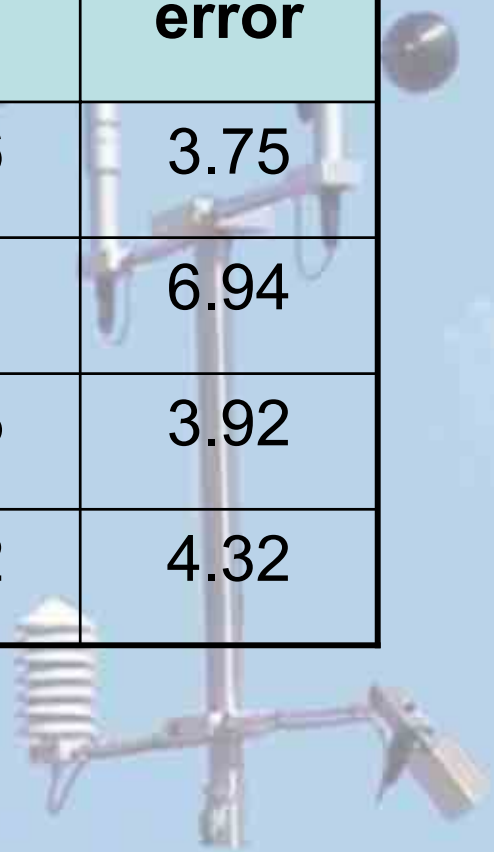
- Synoptic stations heights not defined well
- BISK pressure sensor large bias





Meteorological parameters: GPT accuracy assasement

Stations	pressure [hPa]		temperature [^{0}C]	
	bias	error	bias	error
WROC	-2.64	7.68	-1.36	3.75
GOPE	0.14	4.02	0.74	6.94
SNEC	0.32	6.58	-1.85	3.92
BISK	-48.88	9.14	-2.22	4.32



Tropospheric Delay: Sources

- Euref product means weekly from all LAC's:

	Apriori model	**Estimates**
OLG since 1397	Dry Niell + MF	ZTD (each 1h). Wet Niell MF, HG (tiliting) for 24 hours
BKG since 1320	Dry Saastamoinen + dry-Niell MF	ZWD (each 1h) + Wet Niell MF
BKG since 1400	Dry Niell	Zenith delay corrections (1h each station), wet-Niell MF. HG (tilting) for 24 hours.

- Tropospheric delay - Saastamoinen eqations:

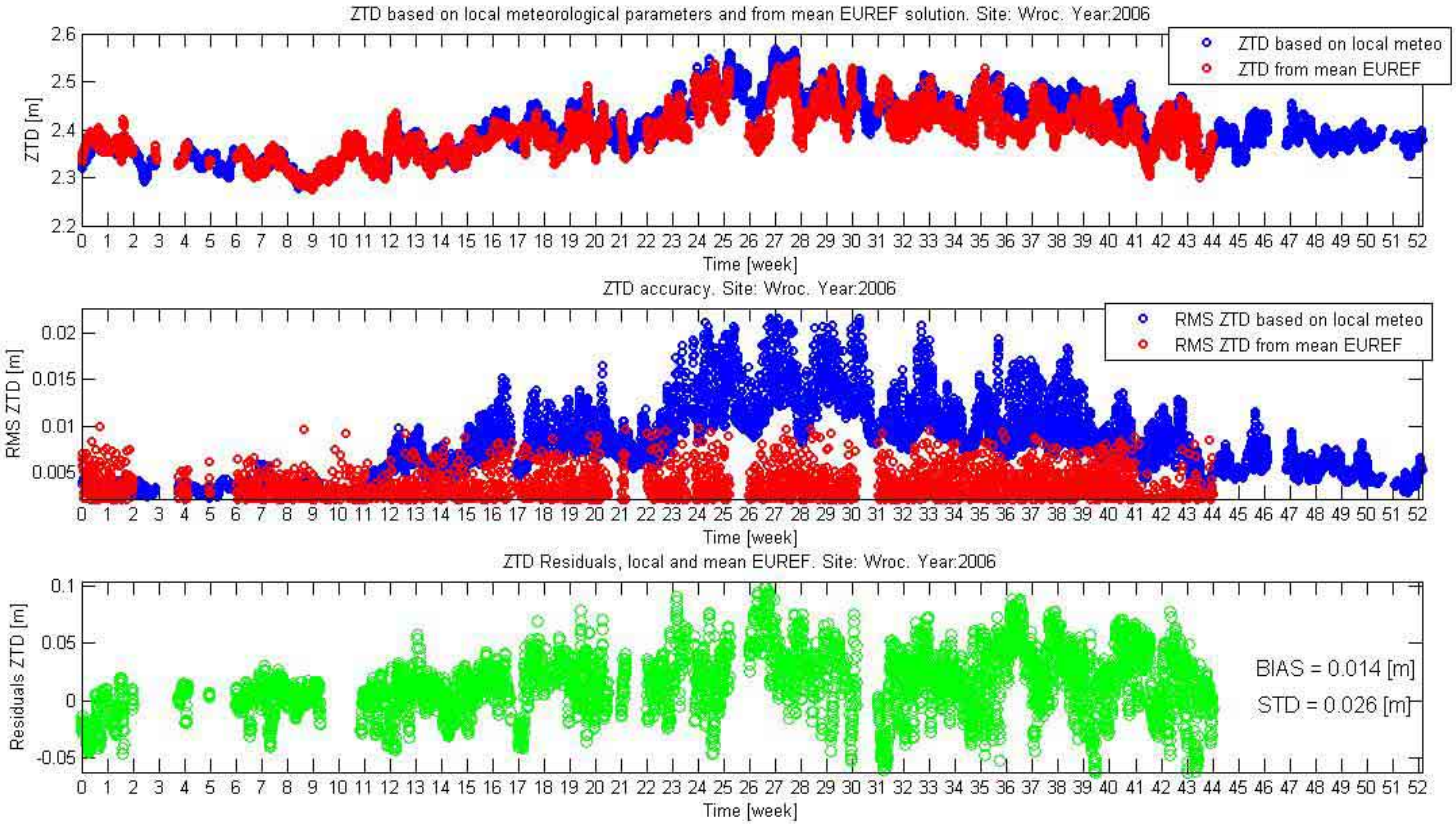
$$ZWD = 0.002277 \cdot \left(\frac{1255}{T_0[^oK]} + 0.05 \right) \cdot e_0[hPa]$$

$$ZHD = \frac{0.0022767 \cdot \left[\frac{m}{hPa} \right] \cdot P_o}{1 - 0.00266 \cdot \cos 2\varphi - 0.00028 \cdot \left[\frac{1}{km} \right] \cdot h_e}$$

$$ZTD = ZWD + ZHD$$

Tropospheric Delay: Comparison

- Station WROC



Conclusion

- BISK station pressure data failure,
- GOPE too few reference data,
- GPT reliable global model,
- ZTD from meteo data shows general agreement with EUREF mean solution.

Thank you for your attention!