Global Navigation Satellite System data processing at near real time

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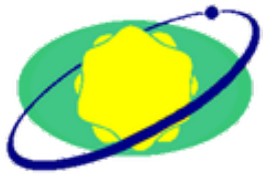
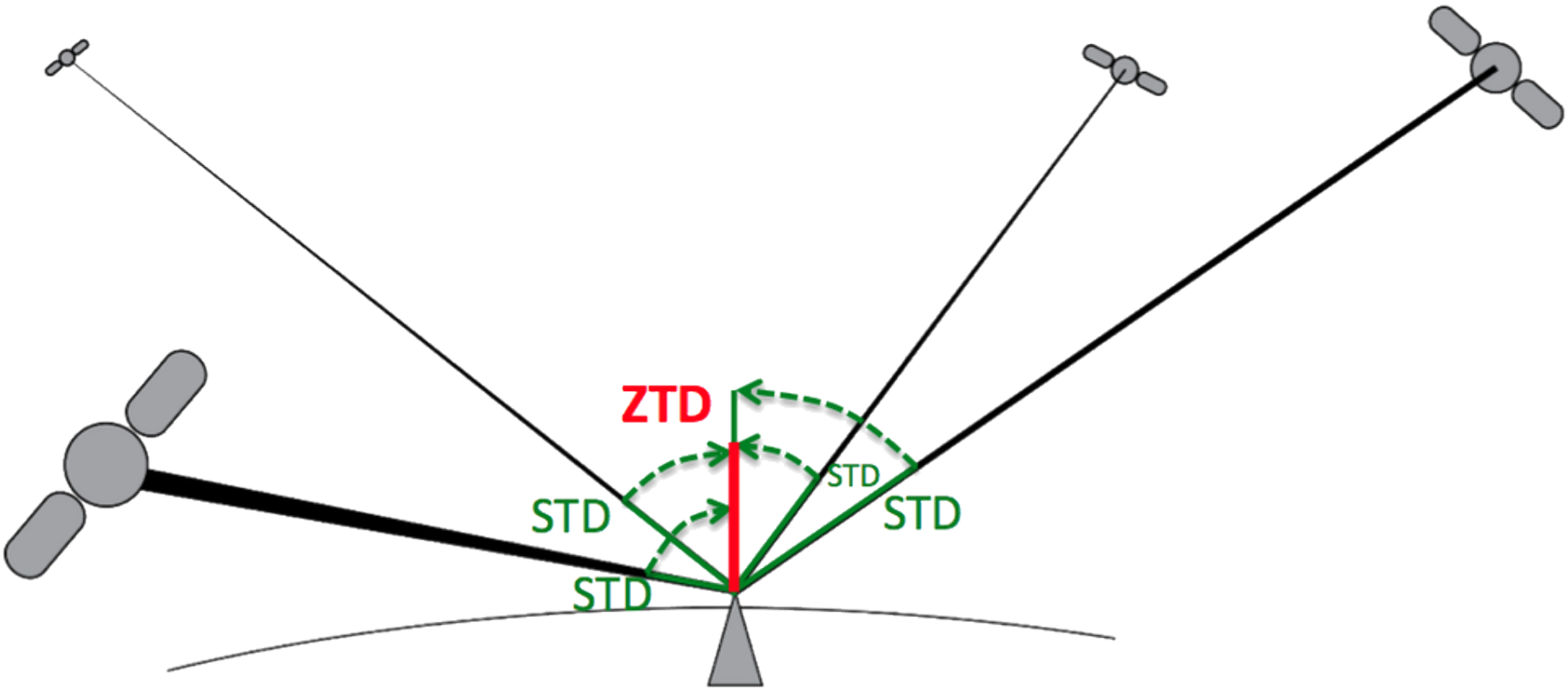


Introduction



Data processing

GNSS data processing may be divided from latency point of view on:

- Final processing,
- Near real time processing,
- Real time processing.

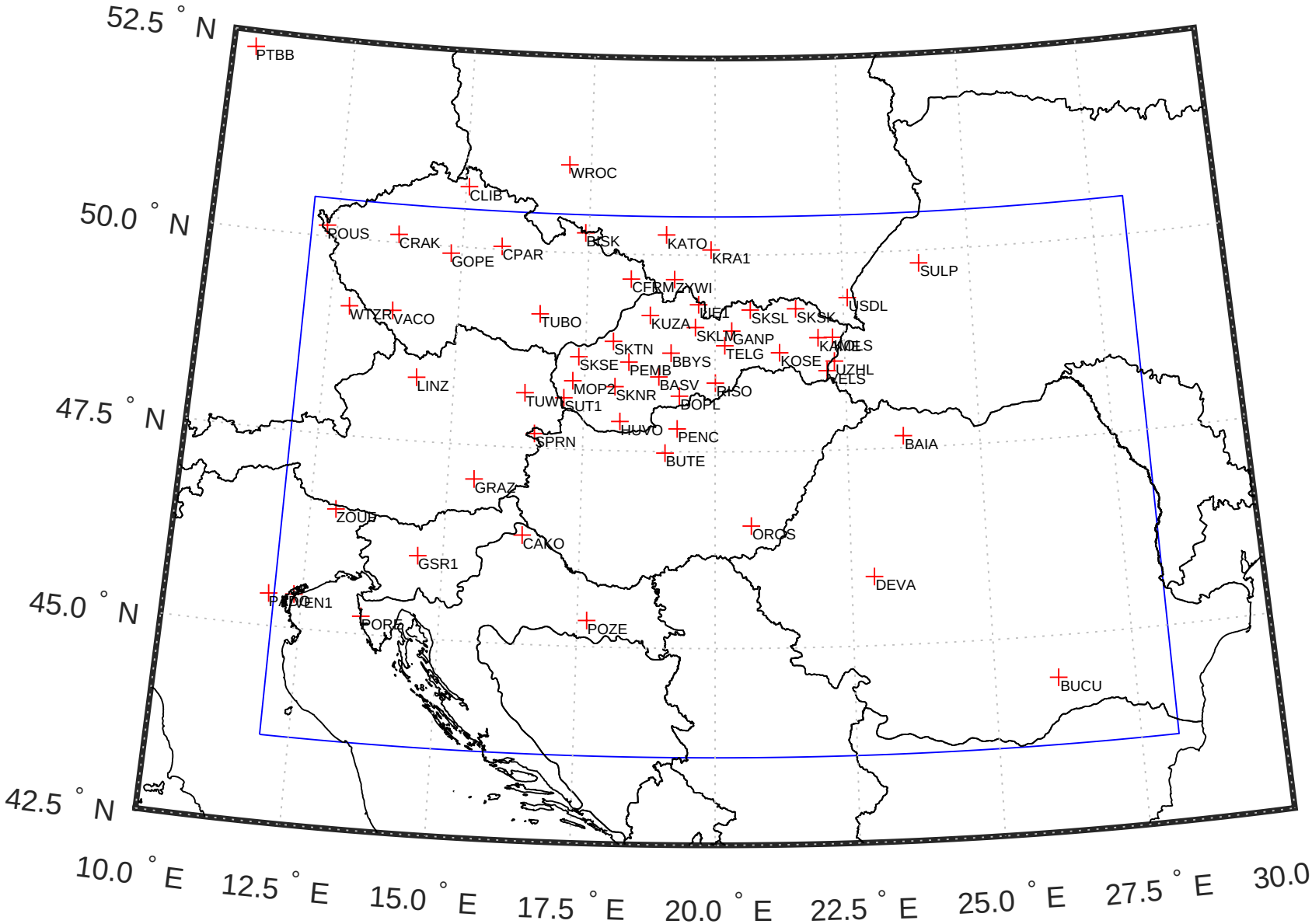
GNSS data processing may be divided also from processing strategy point of view on:

- Precise network positioning,
- Precise point positioning.

Routine processing

- GPS and GLONASS,
- network processing at near real time,
- MAX–OBS baseline strategy,
- 32 min latency,
- 59 stations are being processed every hour,
- 40 stations are from Euref network,
- 6 stations are from IGS network,
- 13 stations are from Austrian, Czech, Hungarian and Slovak national networks of permanent GNSS stations.
- `http://space.vm.stuba.sk/pwvgraph/`

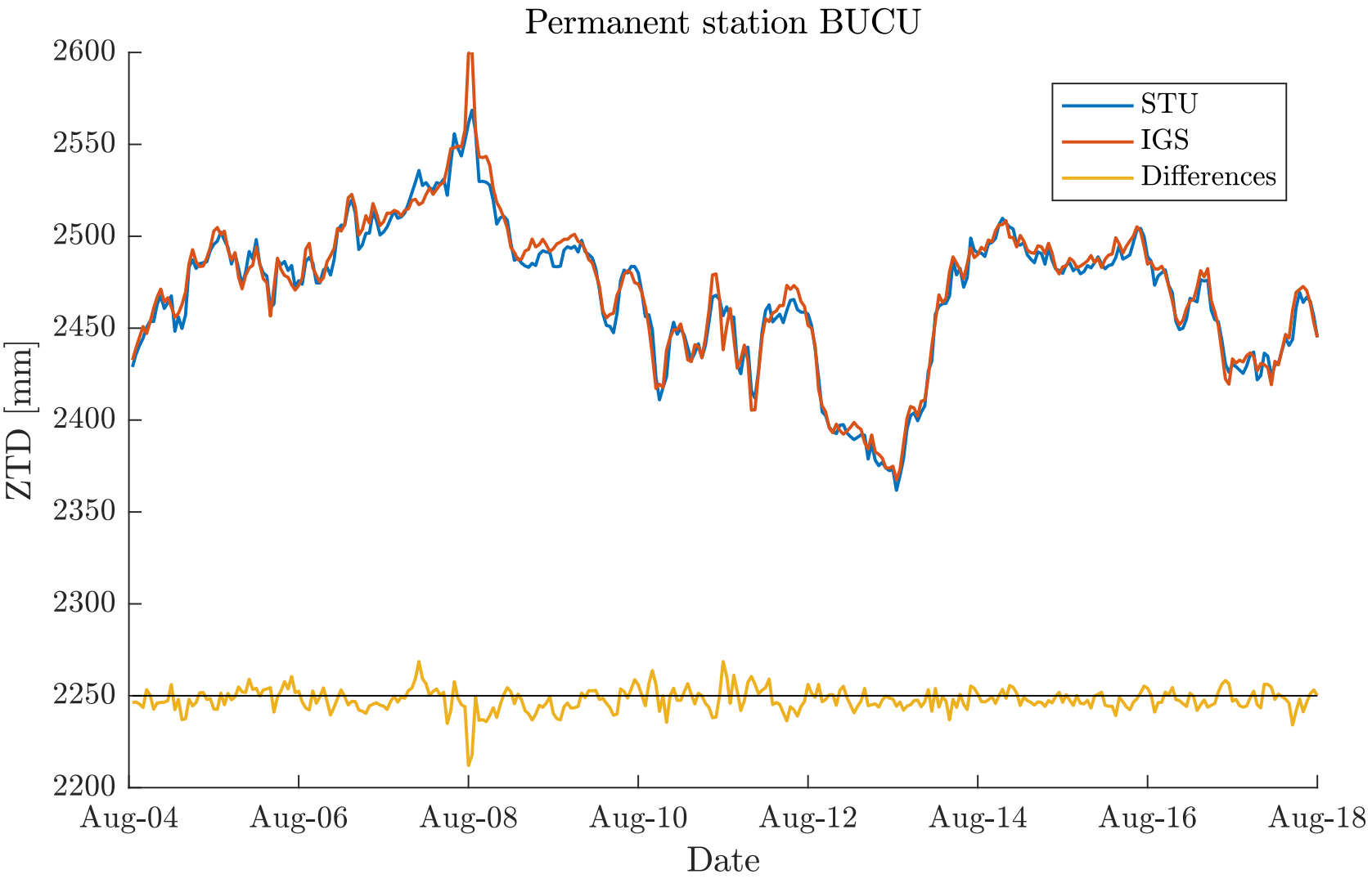
Routine processing



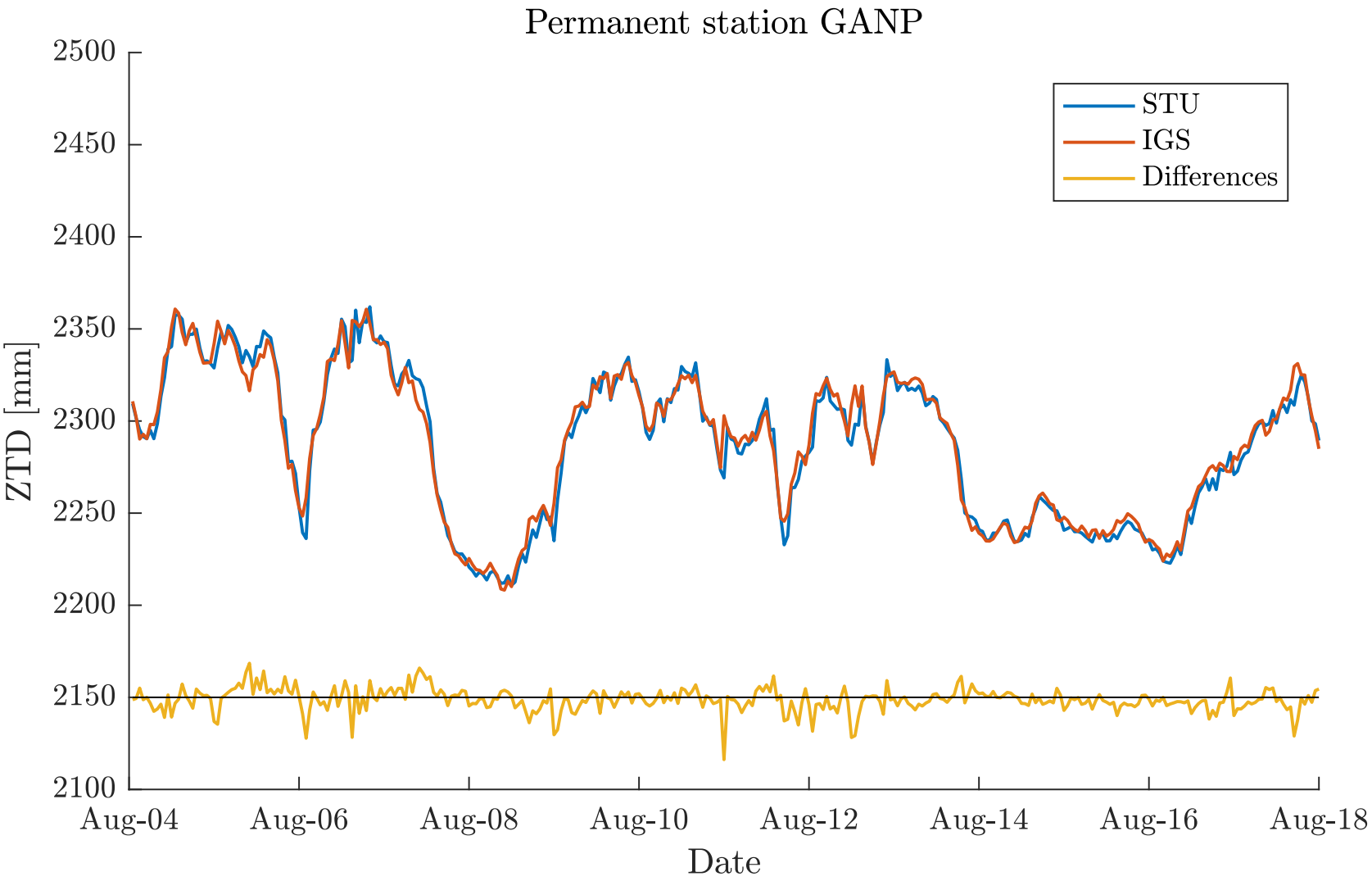
Result comparison

- IGS stations
- Final Precise point positioning
- Bucuresti, Romania – BUCU
- Gánovce, Slovakia – GANP
- Graz, Austria – GRAZ
- Uzhgorod, Ukraine – UZHL
- Wettzell, Germany – WTZR
- Zimmerwald, Switzerland – ZIMM
- Differences are shifted about 2150 mm.

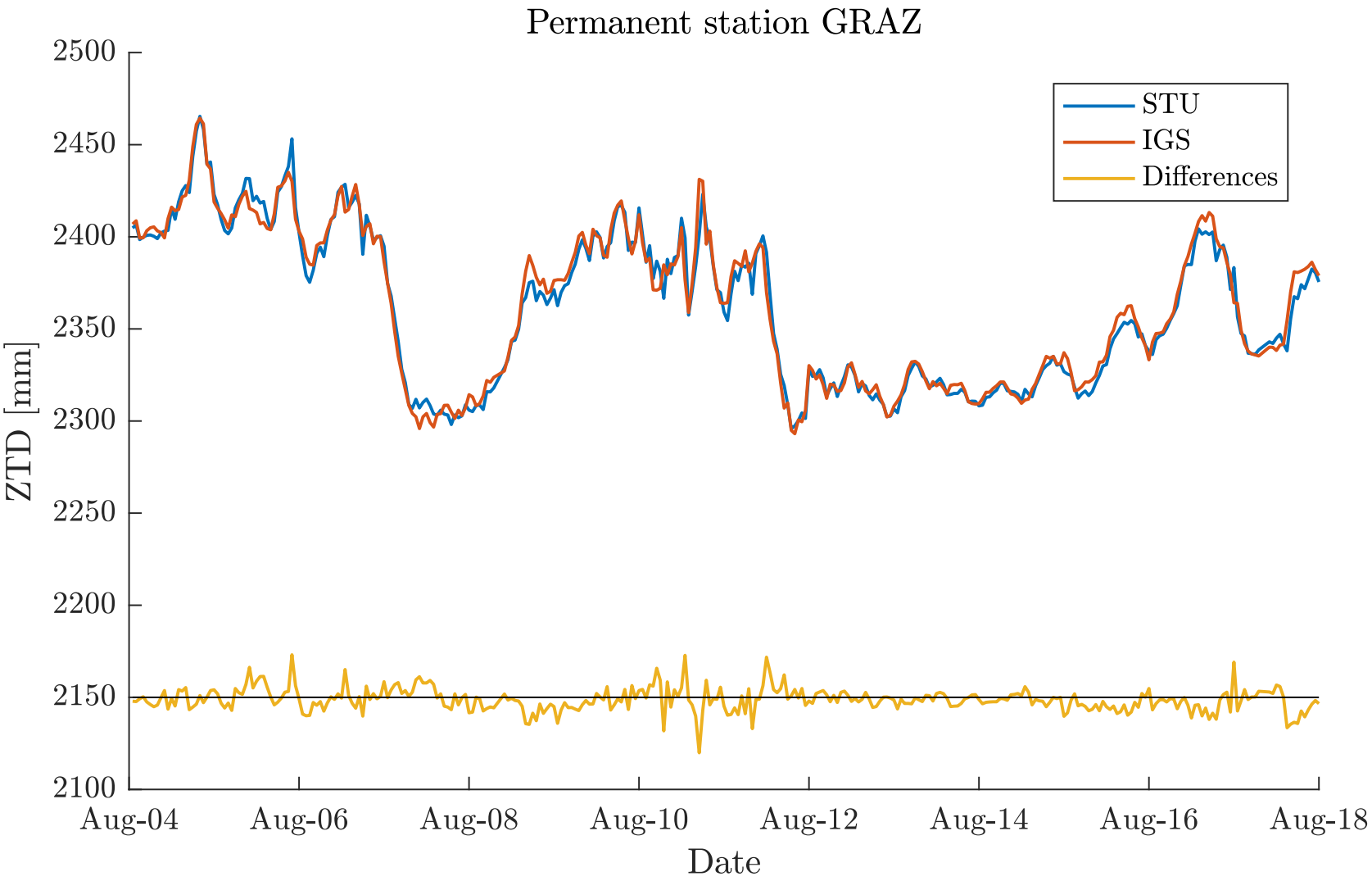
Result comparison



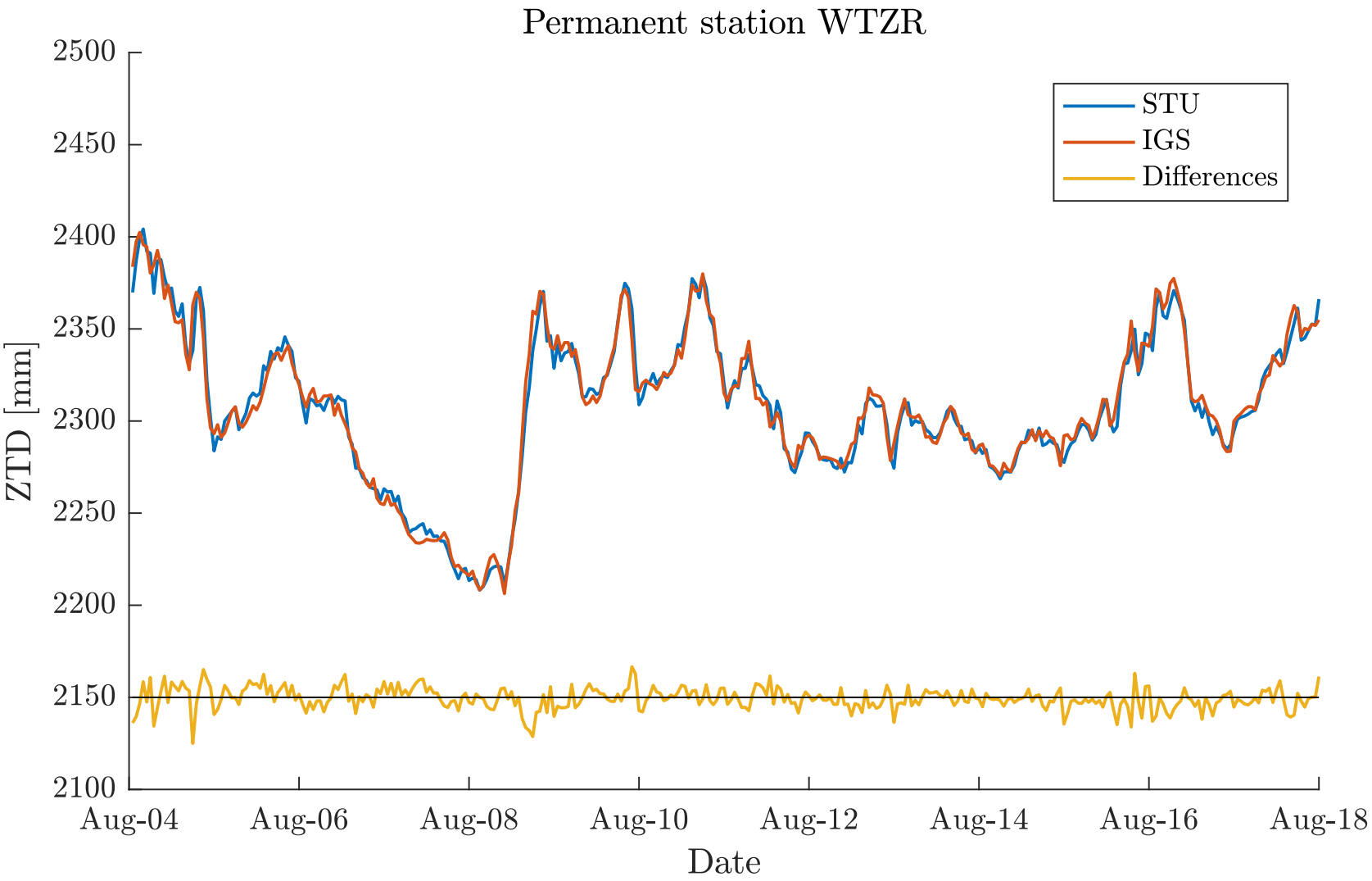
Result comparison



Result comparison



Result comparison



Result comparison

Table: Statistic of differences

		BUCU	GANP	GRAZ
Correlation		**+0.988**	**+0.988**	**+0.989**
Minimum	[*mm*]	-38.0	-33.8	-30.1
Maximum	[*mm*]	18.6	18.5	23.1
Average	[*mm*]	-2.13	-1.29	-1.26
Standard deviation	[*mm*]	6.08	6.22	6.25
		UZHL	WTZR	ZIMM
Correlation		**+0.990**	**+0.989**	**+0.985**
Minimum	[*mm*]	-18.7	-25.0	-23.0
Maximum	[*mm*]	19.7	16.6	22.5
Average	[*mm*]	-0.36	-0.59	0.14
Standard deviation	[*mm*]	5.82	5.92	5.78

ZTD data assimilation

- AROME – Hungarian domain,
- grid point resolution 2.5 km and 60 pressure levels,
- GPS data assimilation is respecting ASSIMILATION OF GPS MOISTURE INFORMATION – Mohamed Zied SASSI,
- 32 white listed stations (more incoming),
- static bias correction,
- only one GNSS data assimilation cycle at 12UTC 18th August 2017 was performed,
- NOGNSS and +GNSS 36 hours forecast.

ZTD data assimilation – technical check

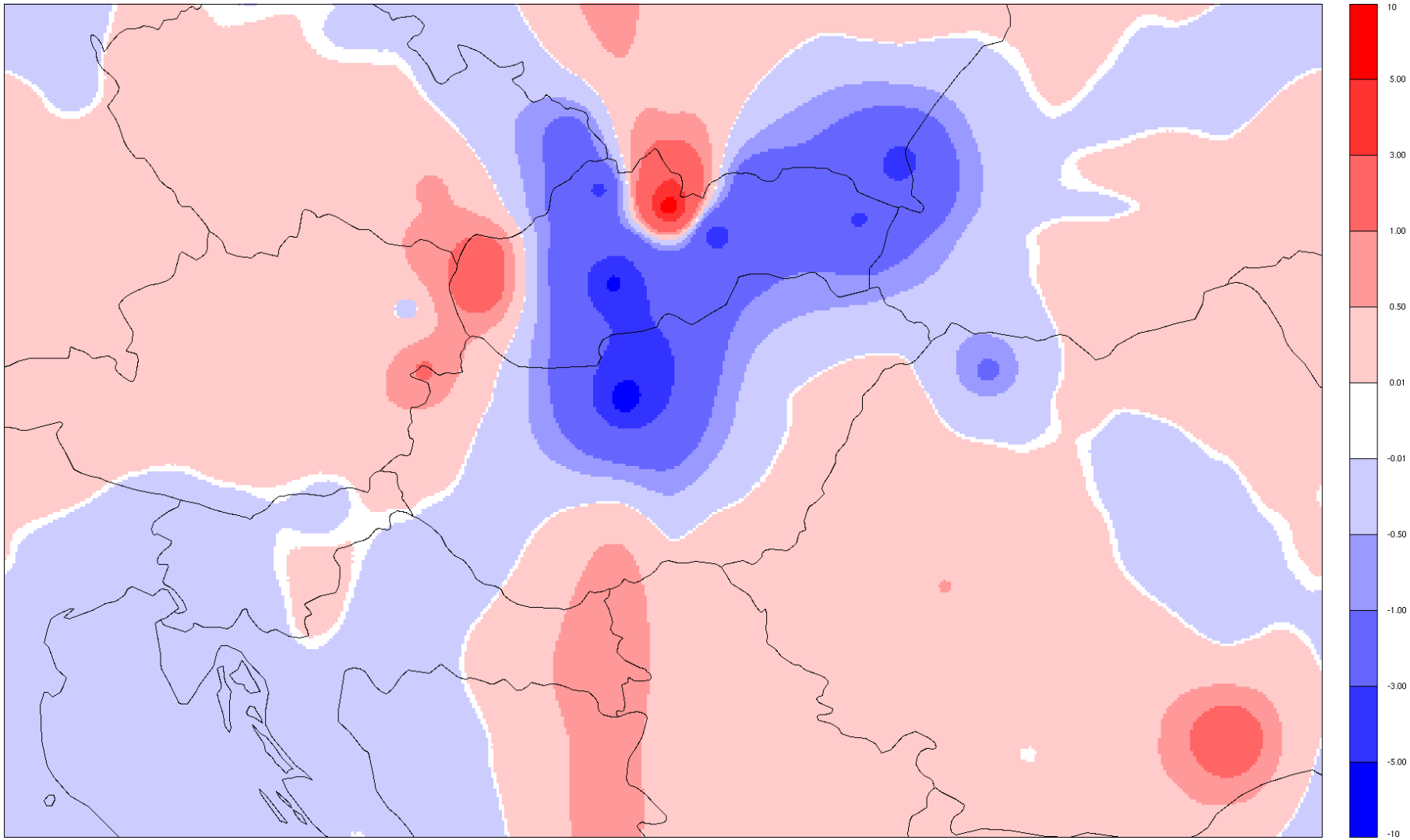


Figure: Differences in specific humidity at 50th pressure level between guess and analysis at 12UTC 18th August 2017.

ZTD data assimilation – technical check

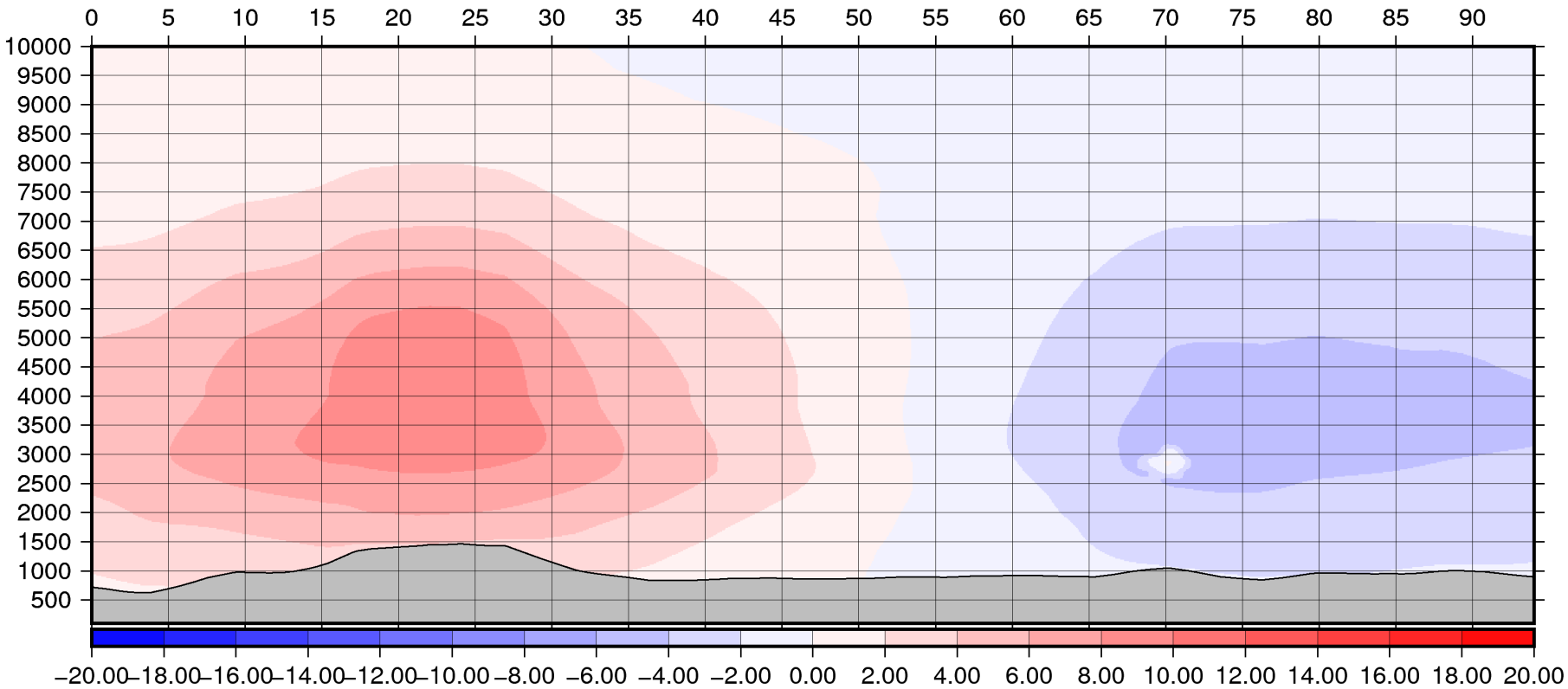


Figure: Differences in relative humidity between guess and analysis at SKLM and GANP permanent stations at 12UTC 18th August 2017.

ZTD data assimilation – technical check

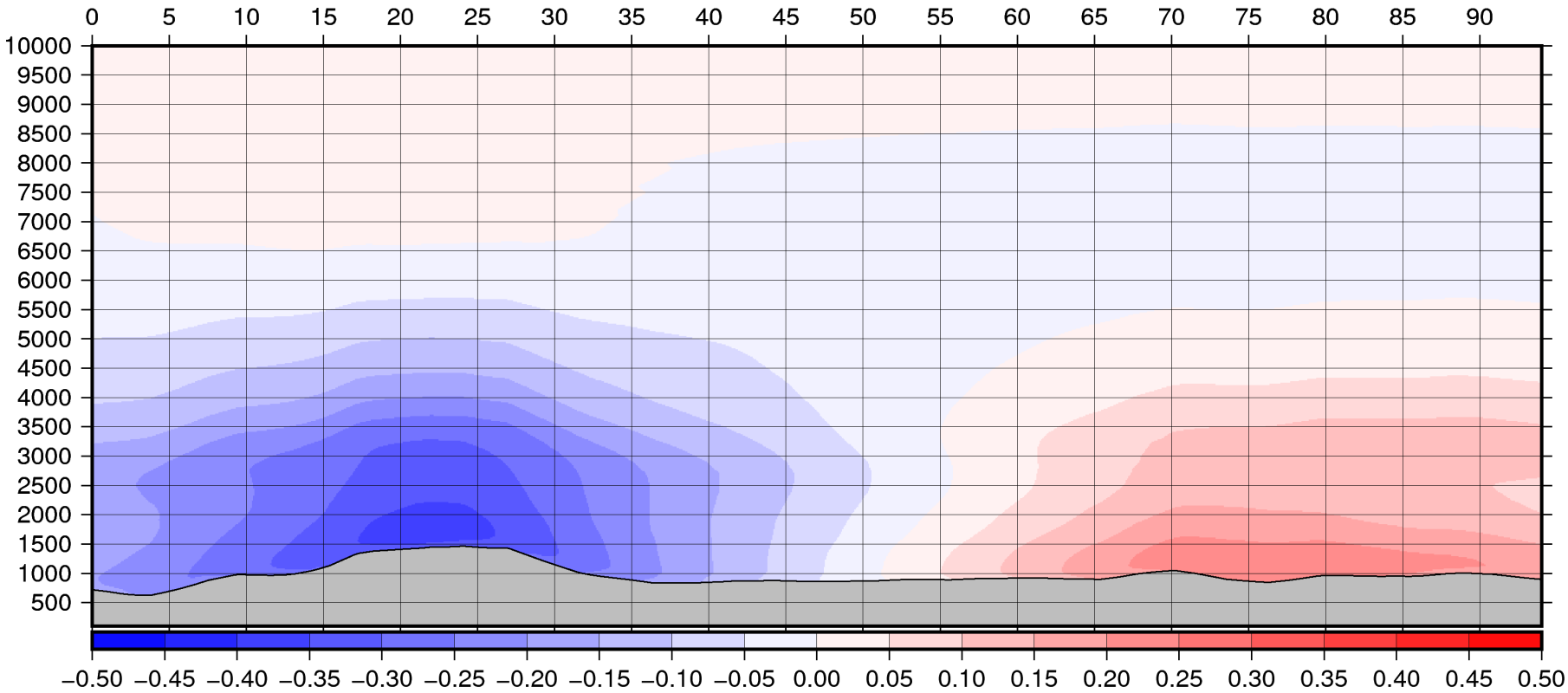


Figure: Differences in temperature between guess and analysis at SKLM and GANP permanent stations at 12UTC 18th August 2017.

ZTD data assimilation – technical check

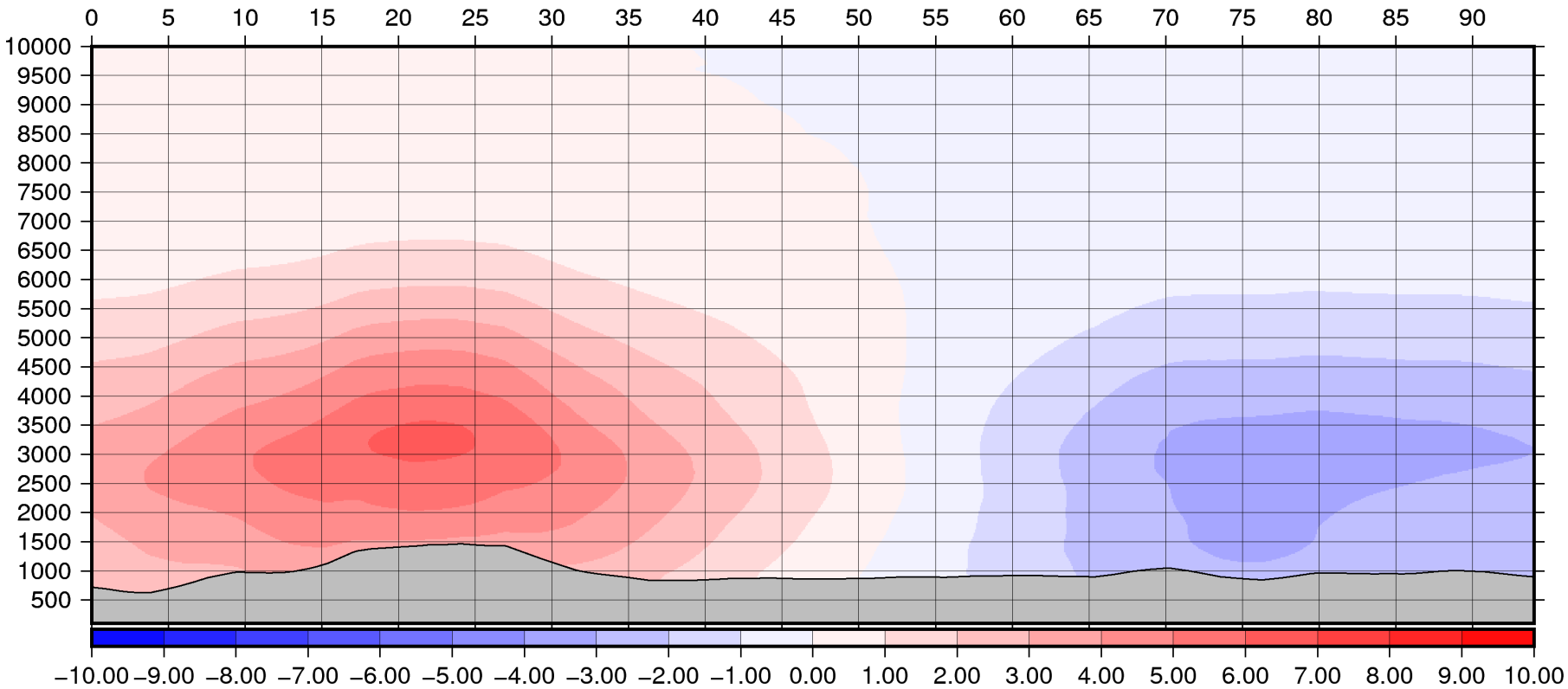


Figure: Differences in specific humidity between guess and analysis at SKLM and GANP permanent stations at 12UTC 18th August 2017.

ZTD data assimilation – technical check

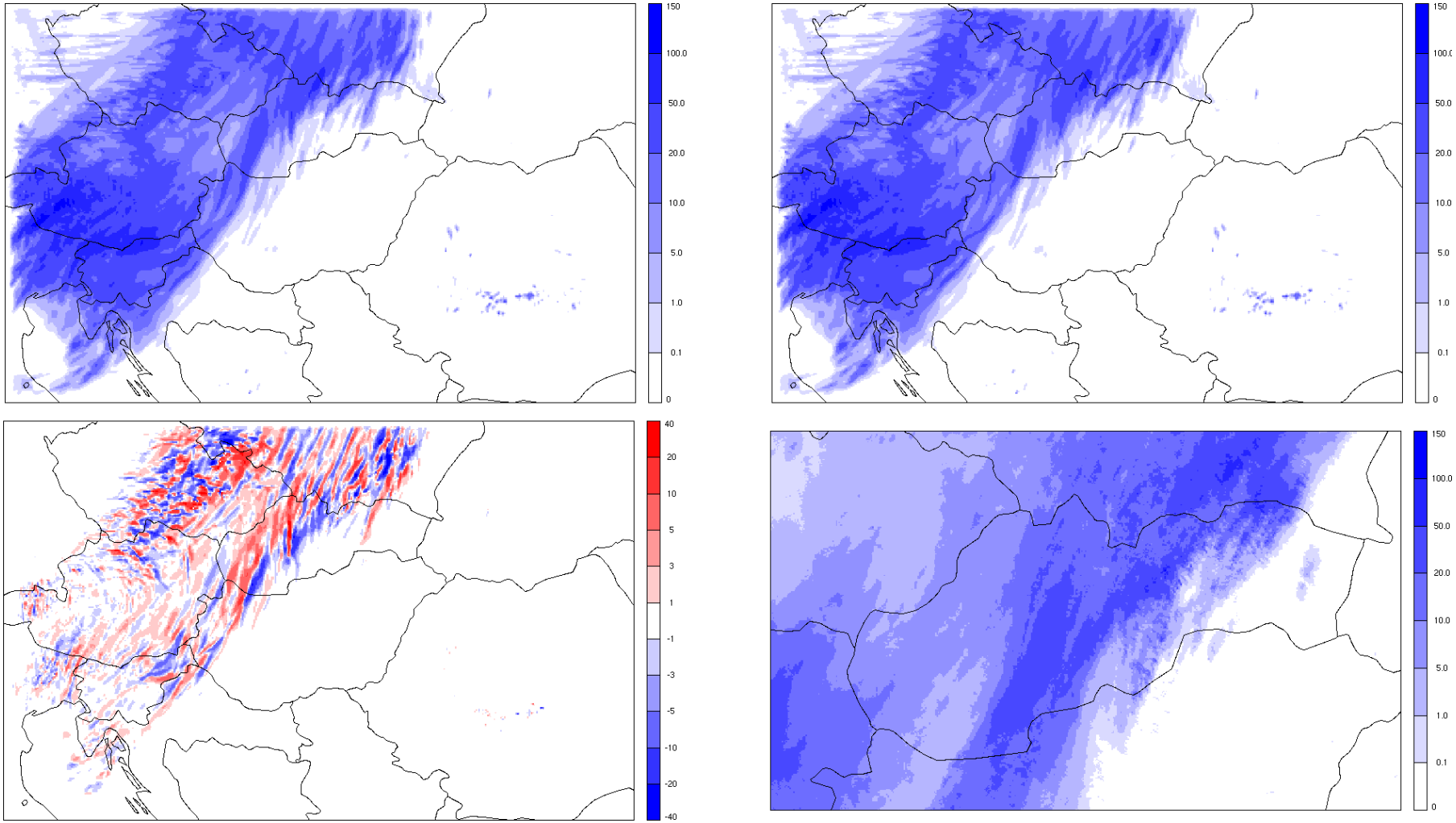


Figure: 24h accumulated rainfall from 00UTC 19th August 2017. NOGNSS (top left), +GNSS (top right), differences (bottom left) and INCA (bottom right).

Conclusions

- Local GNSS processing designed for SHMI purposes,
- obtained ZTD are comparable with IGS final PPP product,
- first 3DVAR data assimilation studies on SHMI,
- result is not convincing from one assimilation cycle.

Future perspectives :

- multiple cycle data assimilation case study,
- add more data types to assimilation.

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I would be grateful for any feedback or advice.

Thank you for your attention.

New generation of permanent GNSS stations