

Advancements in Ionospheric Modeling: Comparative Analysis of VTEC Derivation from Co-Located VLBI and VGOS Stations

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Publication date:

2024

Permanent link:


<https://doi.org/10.3929/ethz-b-000665965>

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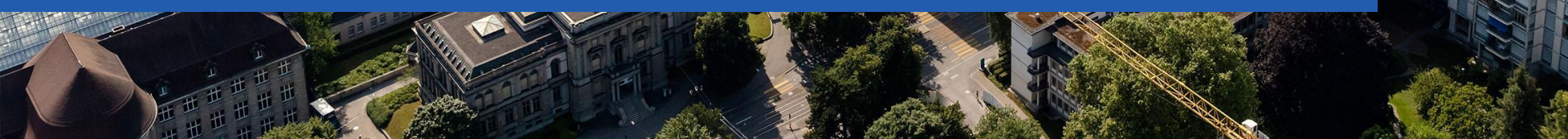
Originally published in:

<https://doi.org/10.5281/zenodo.10869494>

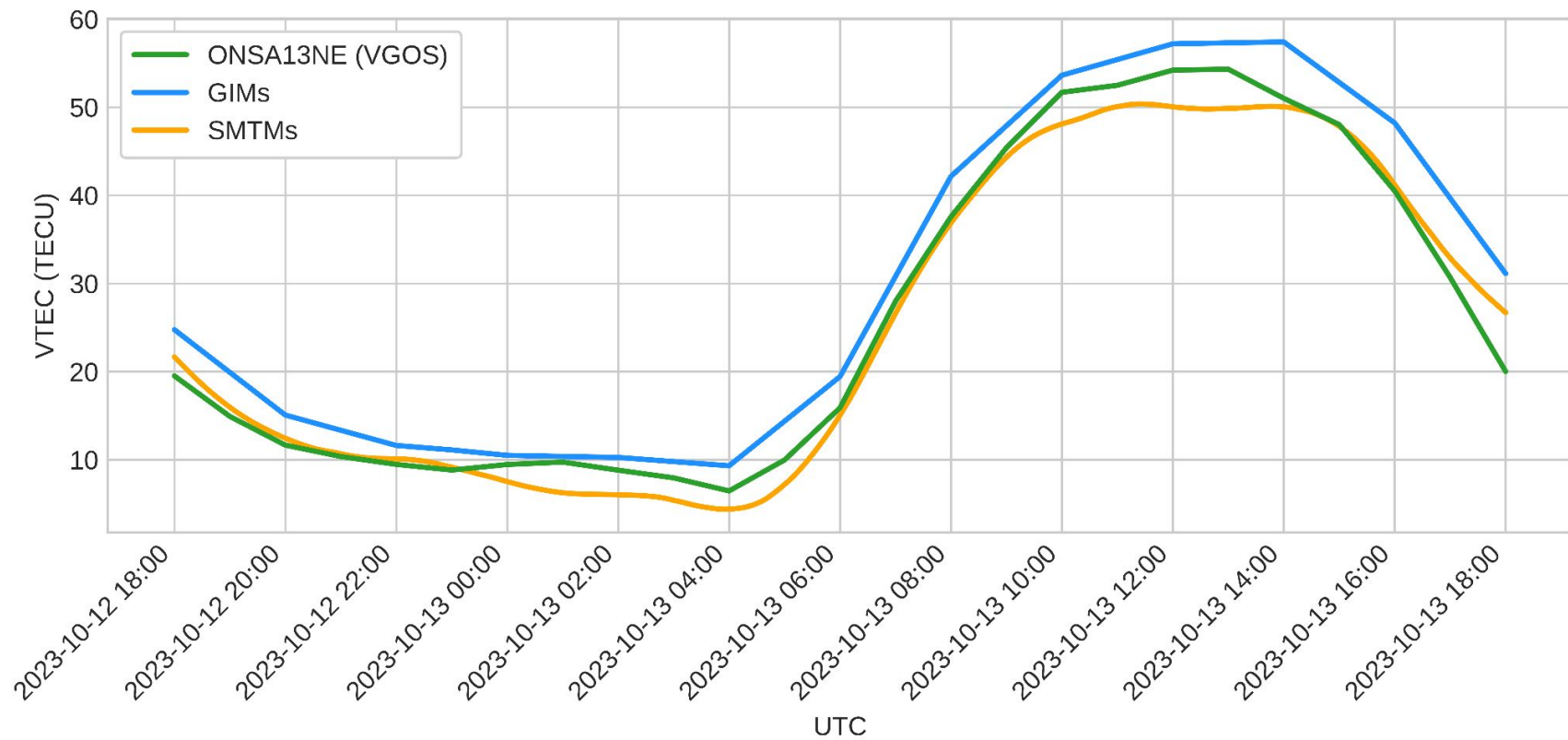


Advancements in Ionospheric Modeling: Comparative Analysis of VTEC Derivation from Co-Located VLBI and VGOS Stations

Arno Rüegg, Benedikt Soja
7. March 2024



What we want:

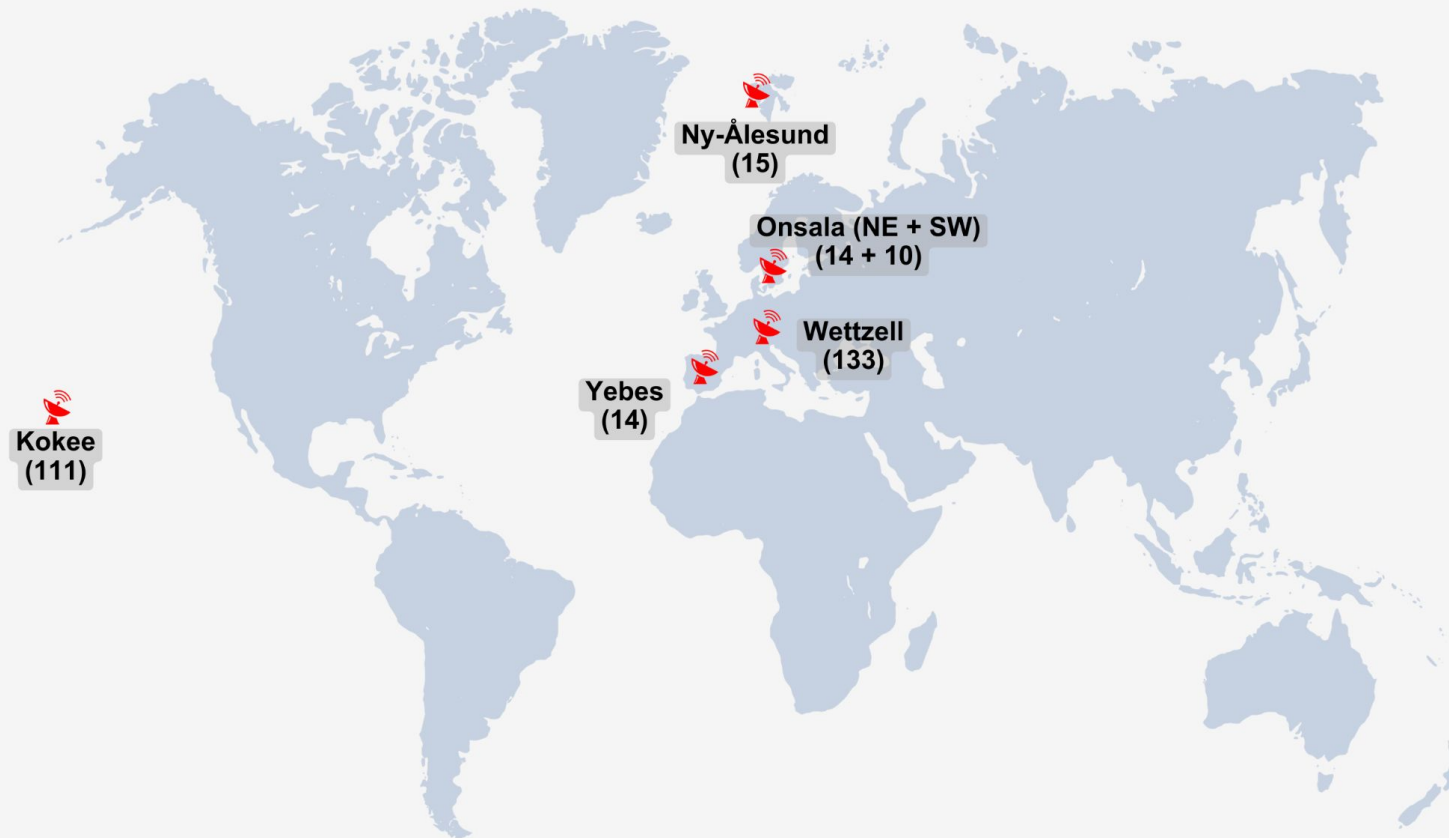


How we get it:

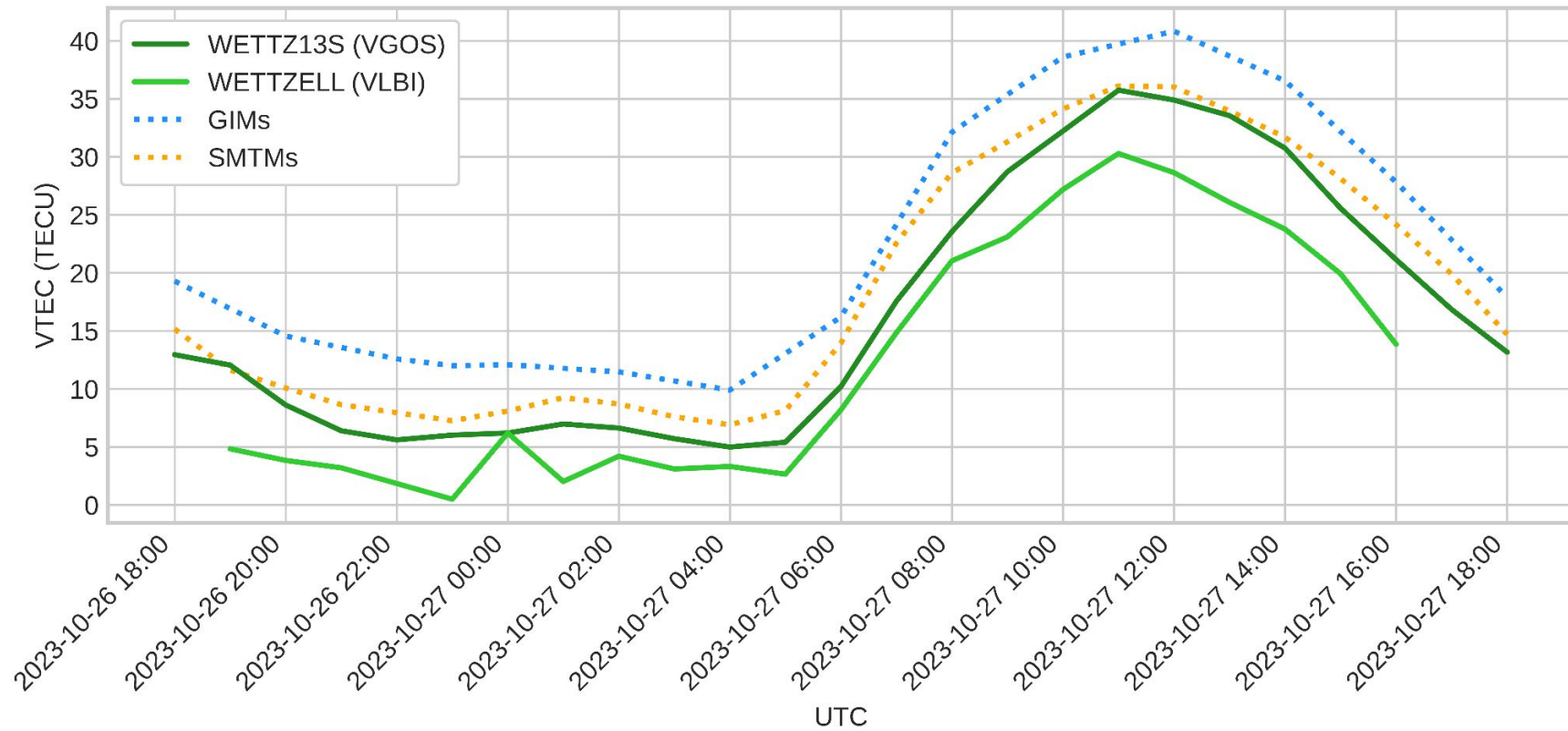


Co-located VLBI and VGOS stations for simultaneous sessions

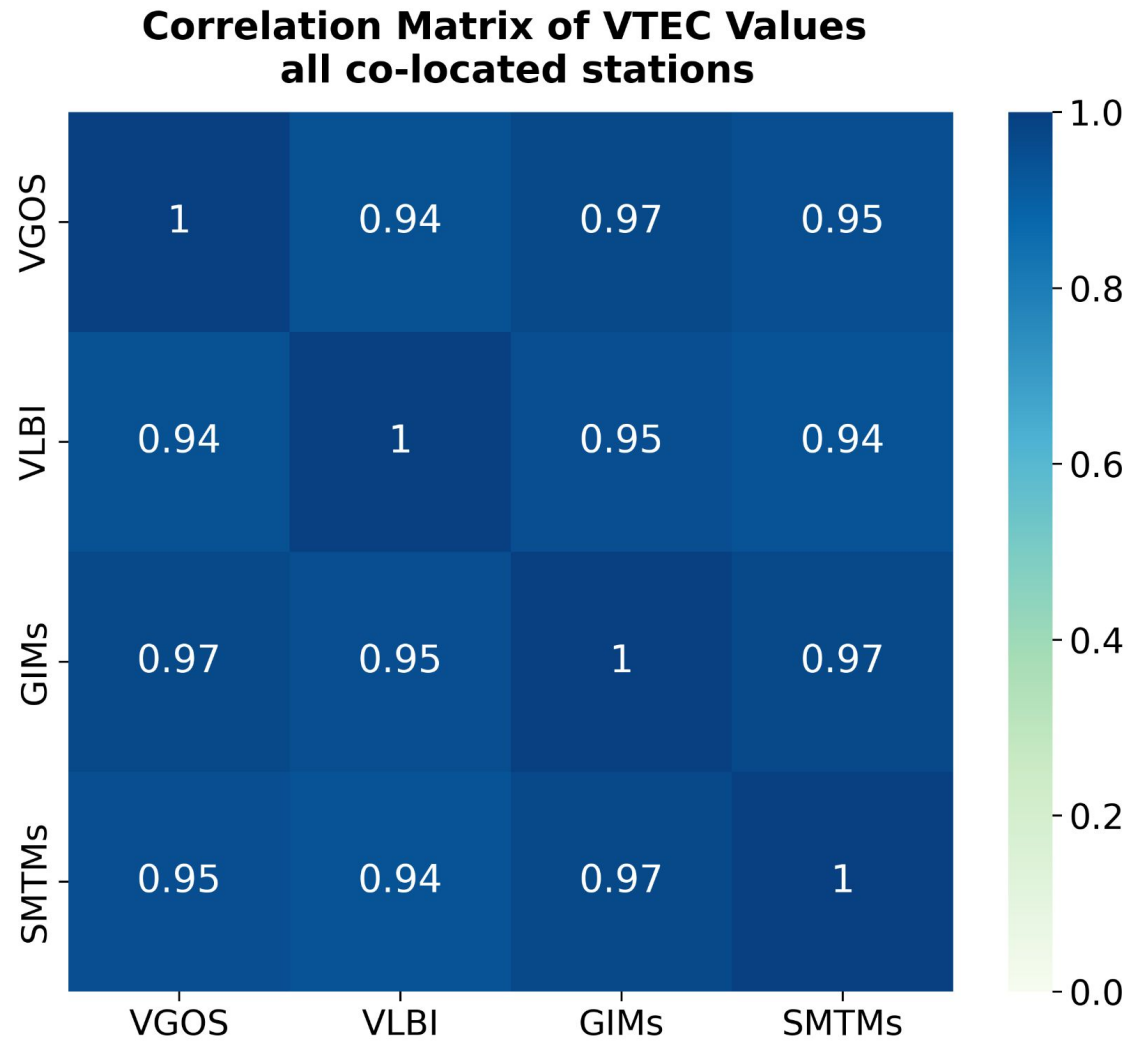
Co-located stations (number of sessions)



Co-located VLBI and VGOS stations for simultaneous sessions

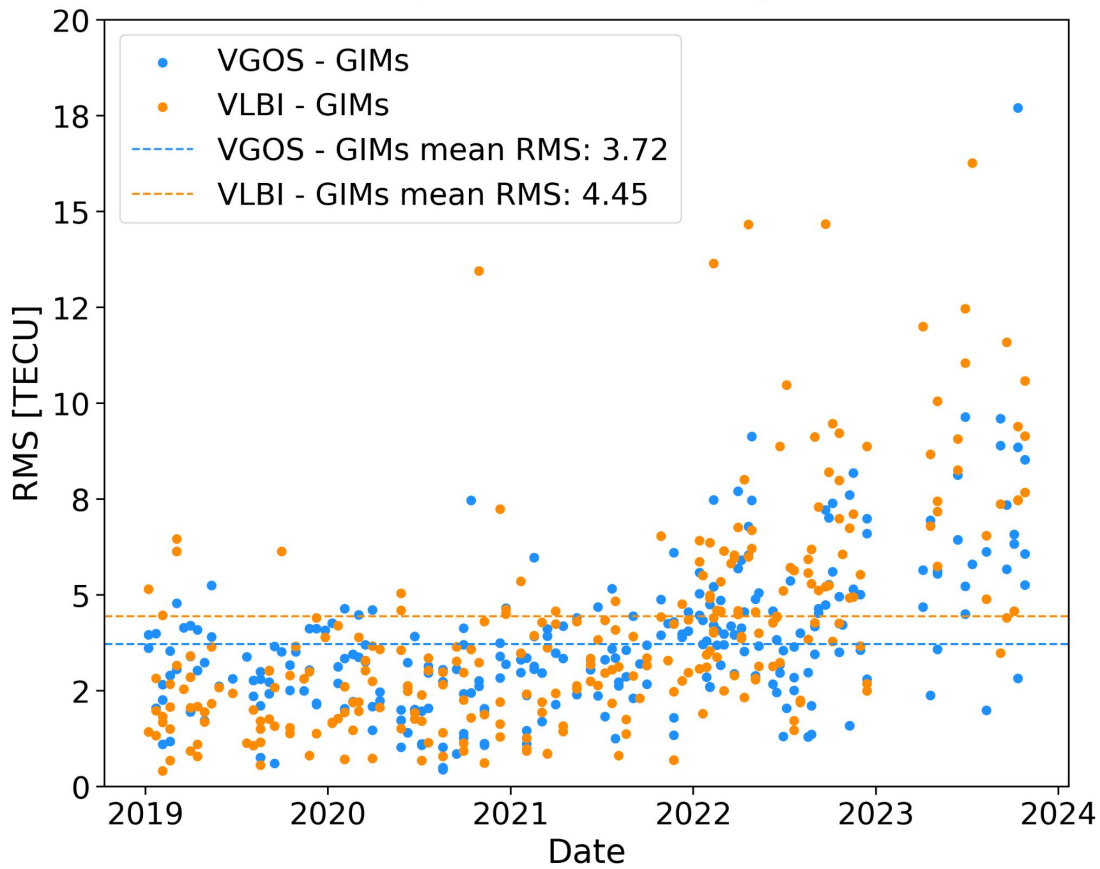


Co-located VLBI and VGOS stations for simultaneous sessions

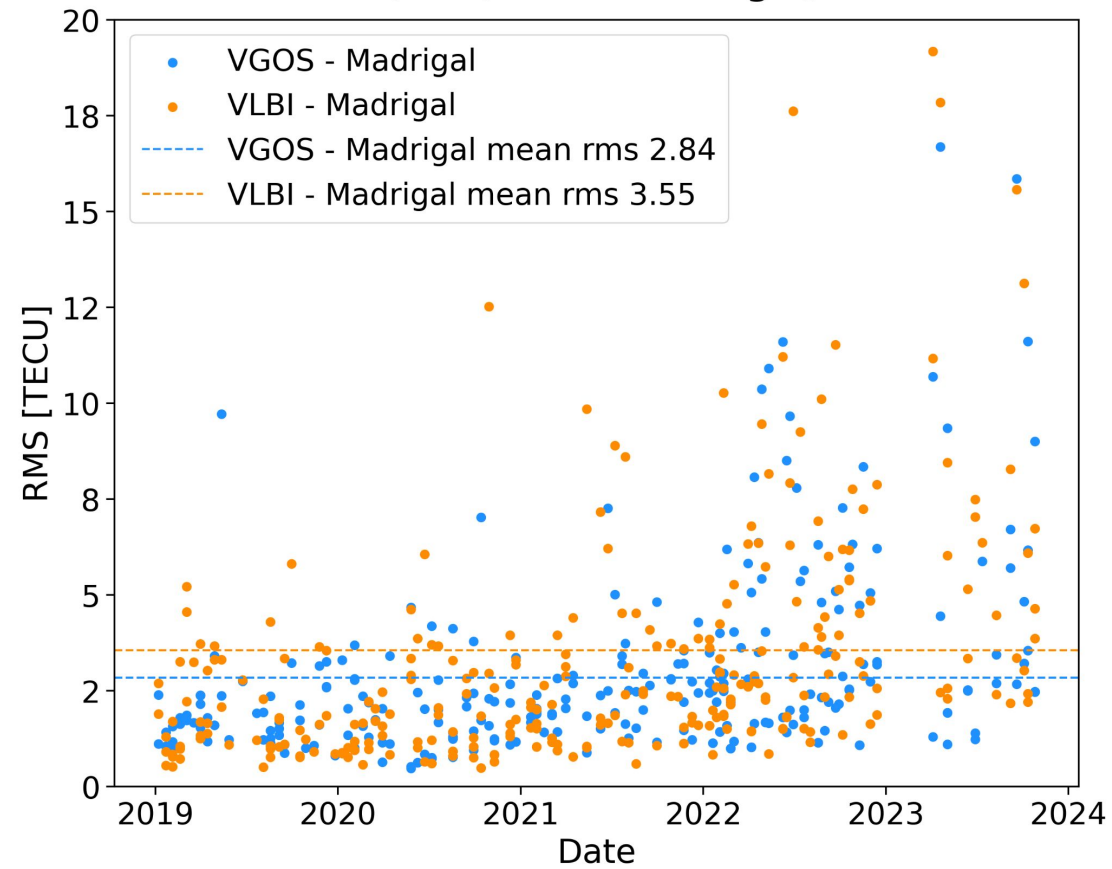


Co-located VLBI and VGOS stations for simultaneous sessions

VTEC Root Mean Squared Differences (VLBI/VGOS - GIMs)

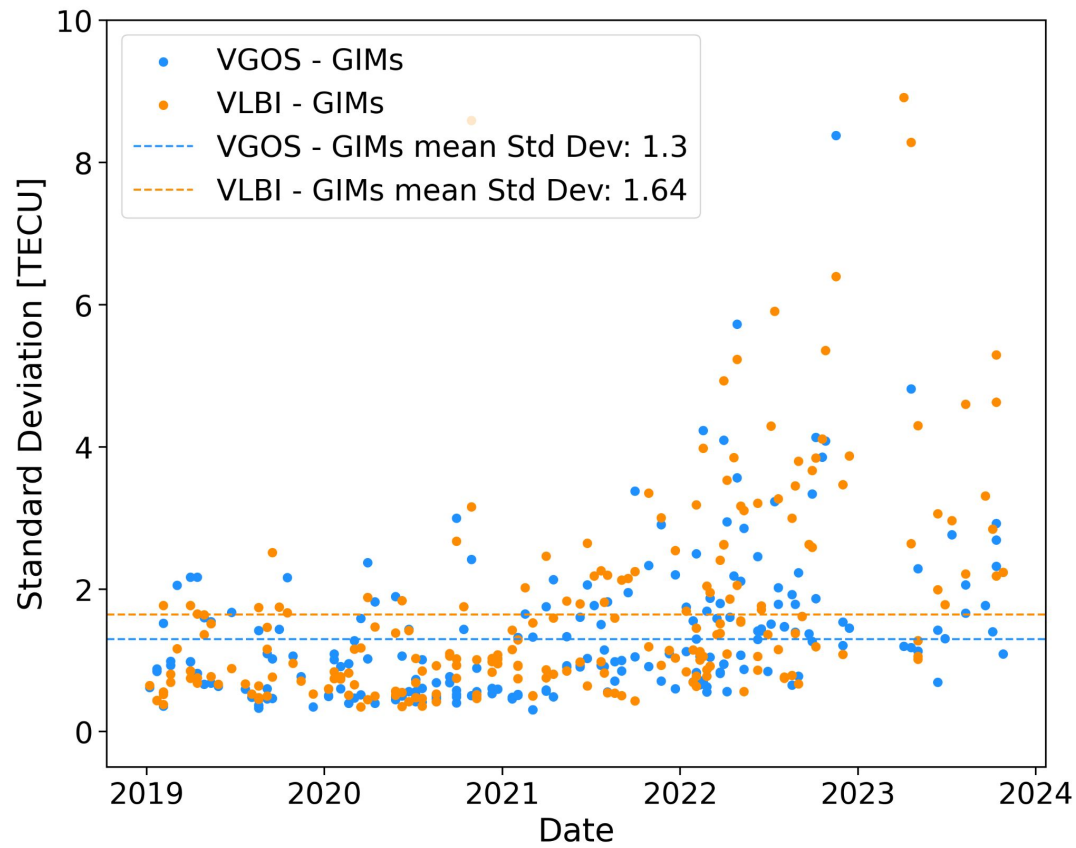


VTEC root mean squared differences (VLBI/VGOS - Madrigal)

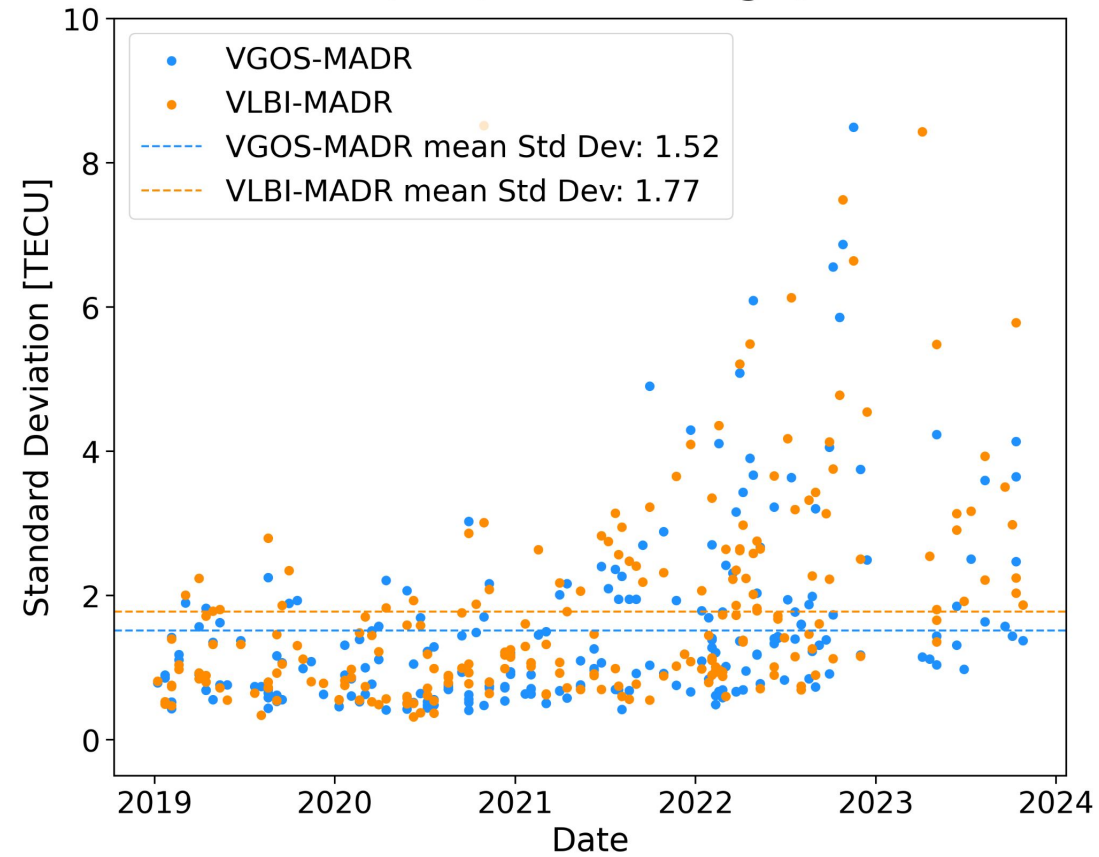


Co-located VLBI and VGOS stations for simultaneous sessions

VTEC Standard Deviations Differences to GIM

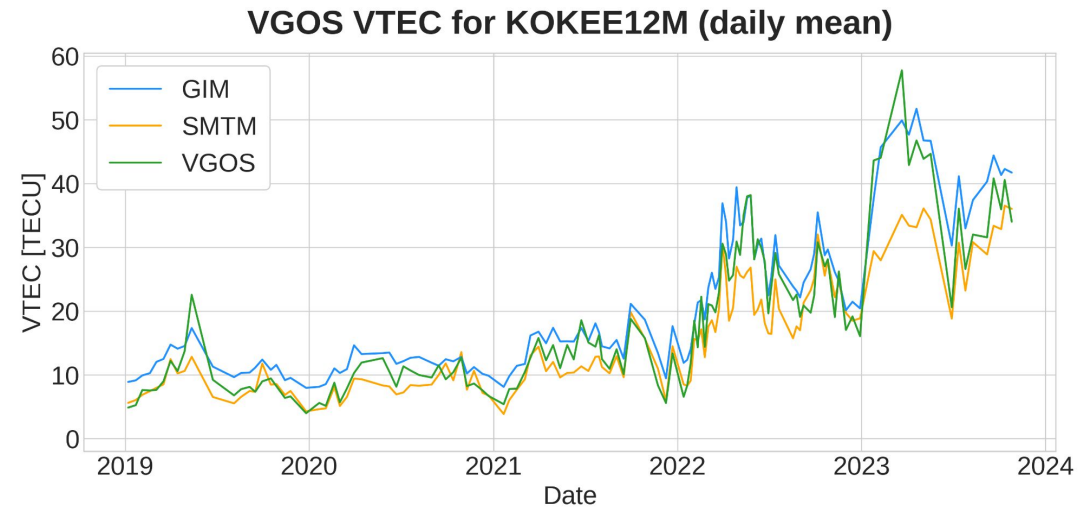


VTEC Standard Deviations (VLBI/VGOS - Madrigal)

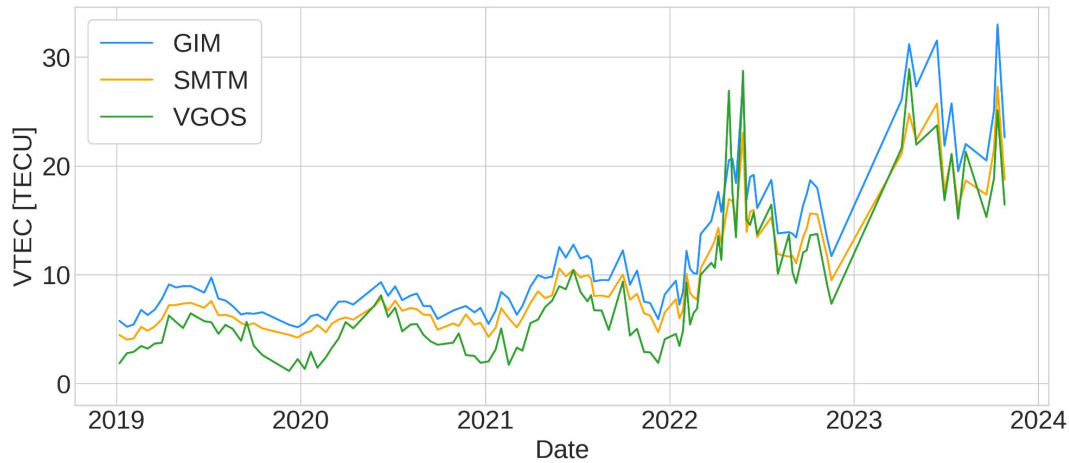


Long-term VTEC Timeseries VGOS Stations

- VGOS sessions since 2019
- allows to create long timeseries



VGOS VTEC for WETTZ13S (daily mean)

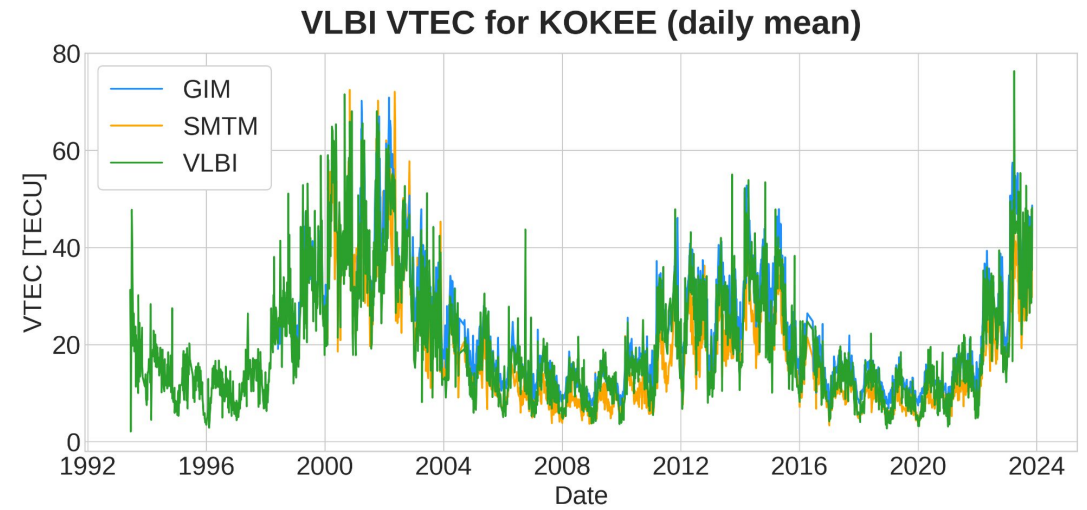


VGOS VTEC for ONSA13NE (daily mean)

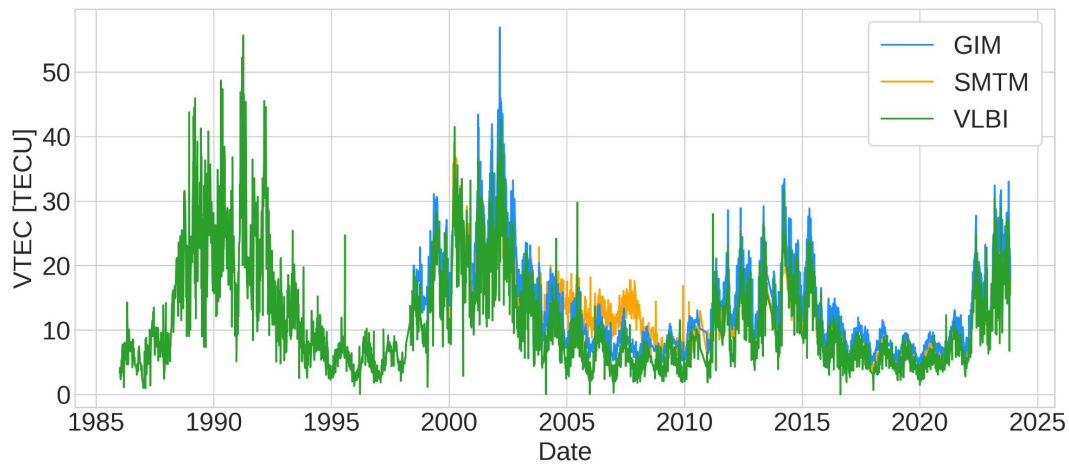


Long-term VTEC Timeseries VLBI Stations

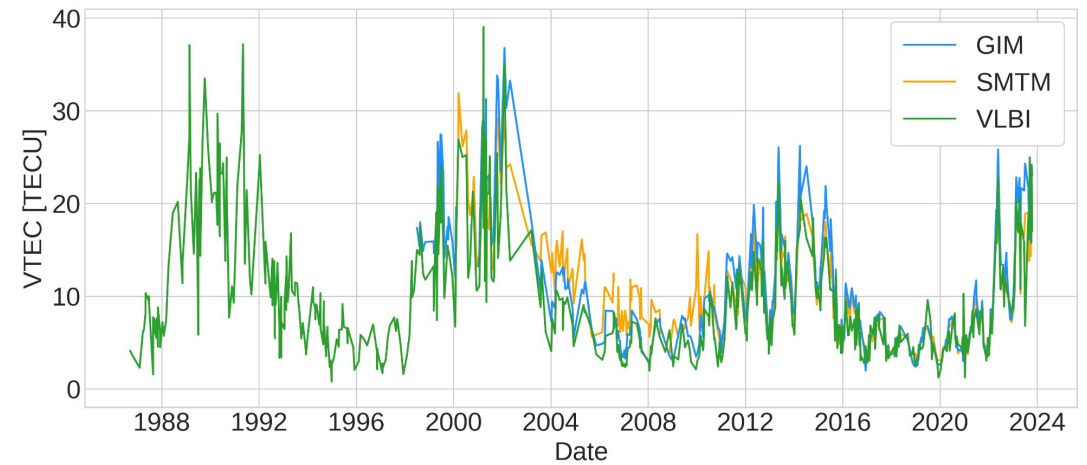
- VLBI sessions since 1993
- allows to create long timeseries



VLBI VTEC for WETTZELL (daily mean)



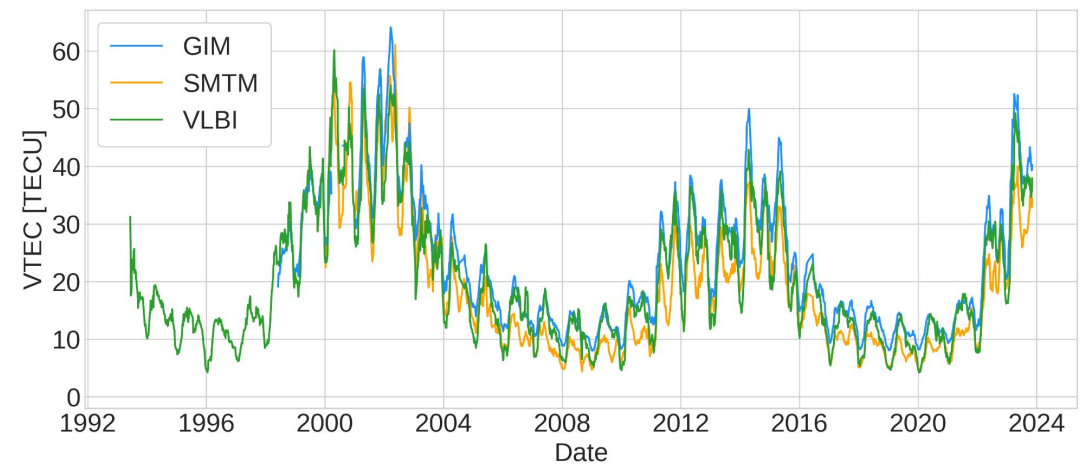
VLBI VTEC for ONSALA60 (daily mean)



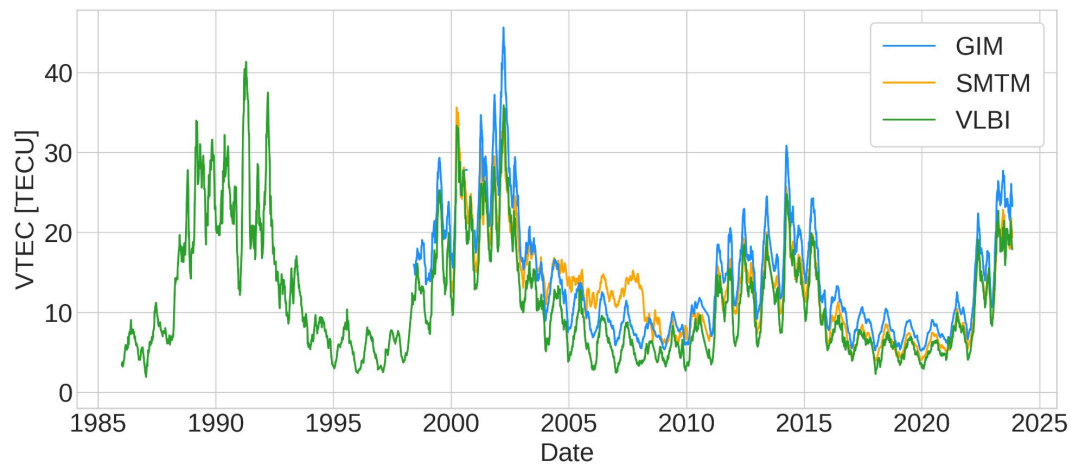
Long-term VTEC Timeseries VLBI Stations

- VLBI sessions since 1993
- allows to create long timeseries

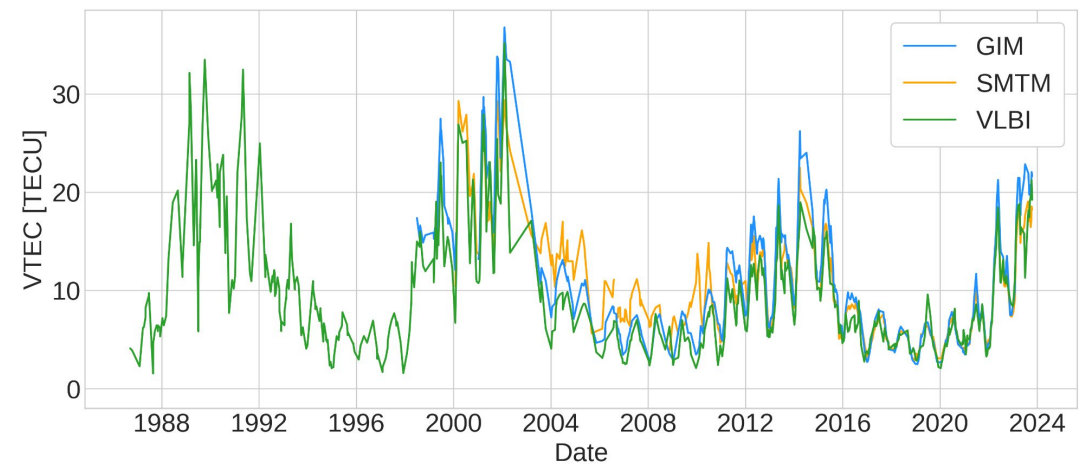
VLBI VTEC for KOKEE (daily mean)



VLBI VTEC for WETTZELL (daily mean)



VLBI VTEC for ONSALA60 (daily mean)



Conclusion

- In general VTEC from both VGOS and VLBI agree well with GIM
- VGOS has a more consistent inter-technological bias
- VLBI gives a unique insight into the earths ionosphere before 1998
- yearly- and solar-cycle-periods can be approximated well

Outlook

- VLBI and VGOS are promising for improving ionospheric models
- Besides long-term effects also short-term anomalies of geomagnetic storms will be analyzed

Thanks for listening!