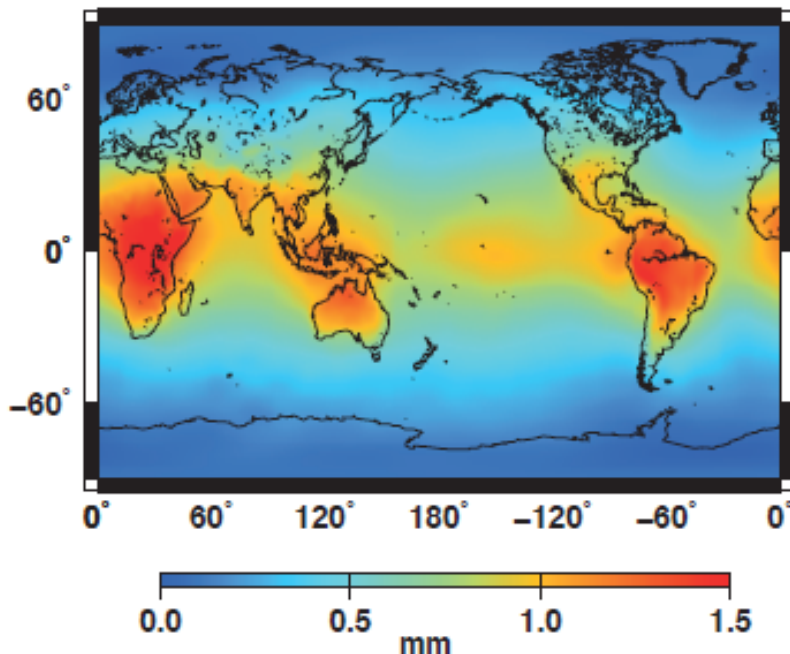


S1/S2 Loading Effects

Johannes Böhm, Hana Krásná, Michael Schindelegger

Tidal Loading Correction Models

- GGFC (Tonie van Dam)
 - based on model by Ray and Ponte (2003; ECMWF operational analysis data, 6-hourly)
 - strategy by van den Dool et al. (1997) for S2

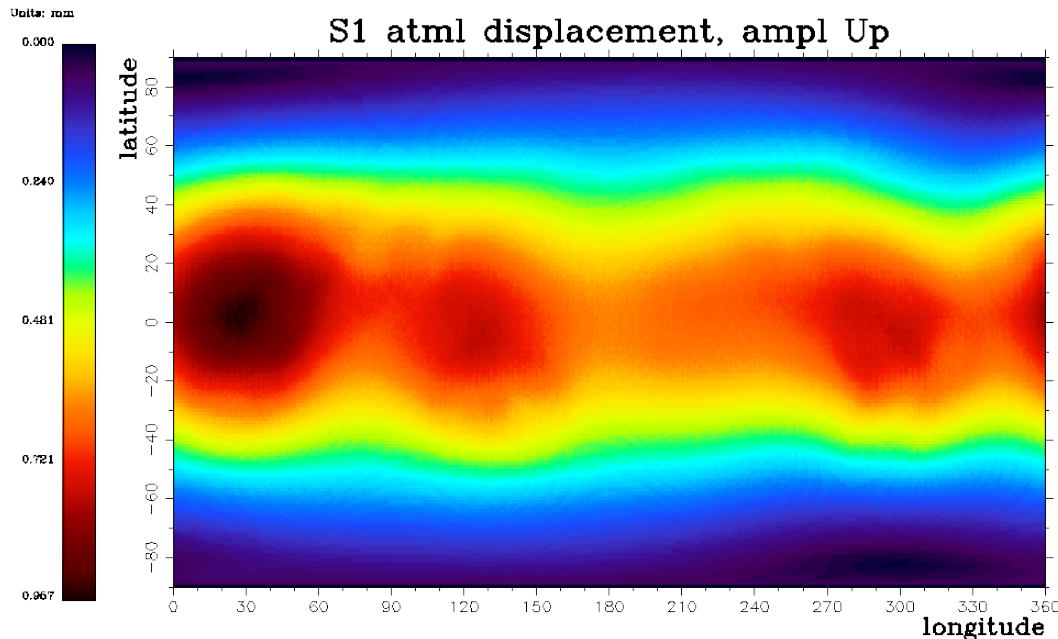


van Dam and Ray (2010)

<http://geophy.uni.lu/ggfc-atmosphere/tide-loading-calculator.html>

Tidal Loading Correction Models

- GSFC (Goddard Space Flight Center)
 - based on Ponte and Ray (2003) model

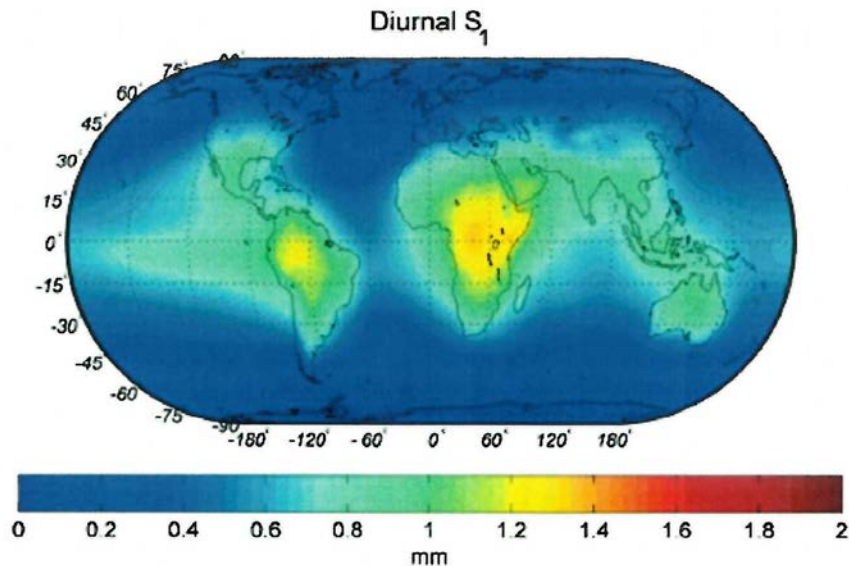


<http://gemini.gsfc.nasa.gov/aplo/>

Tidal Loading Correction Models

- **Vienna**

- derived from 3-hourly DCDA data of the ECMWF



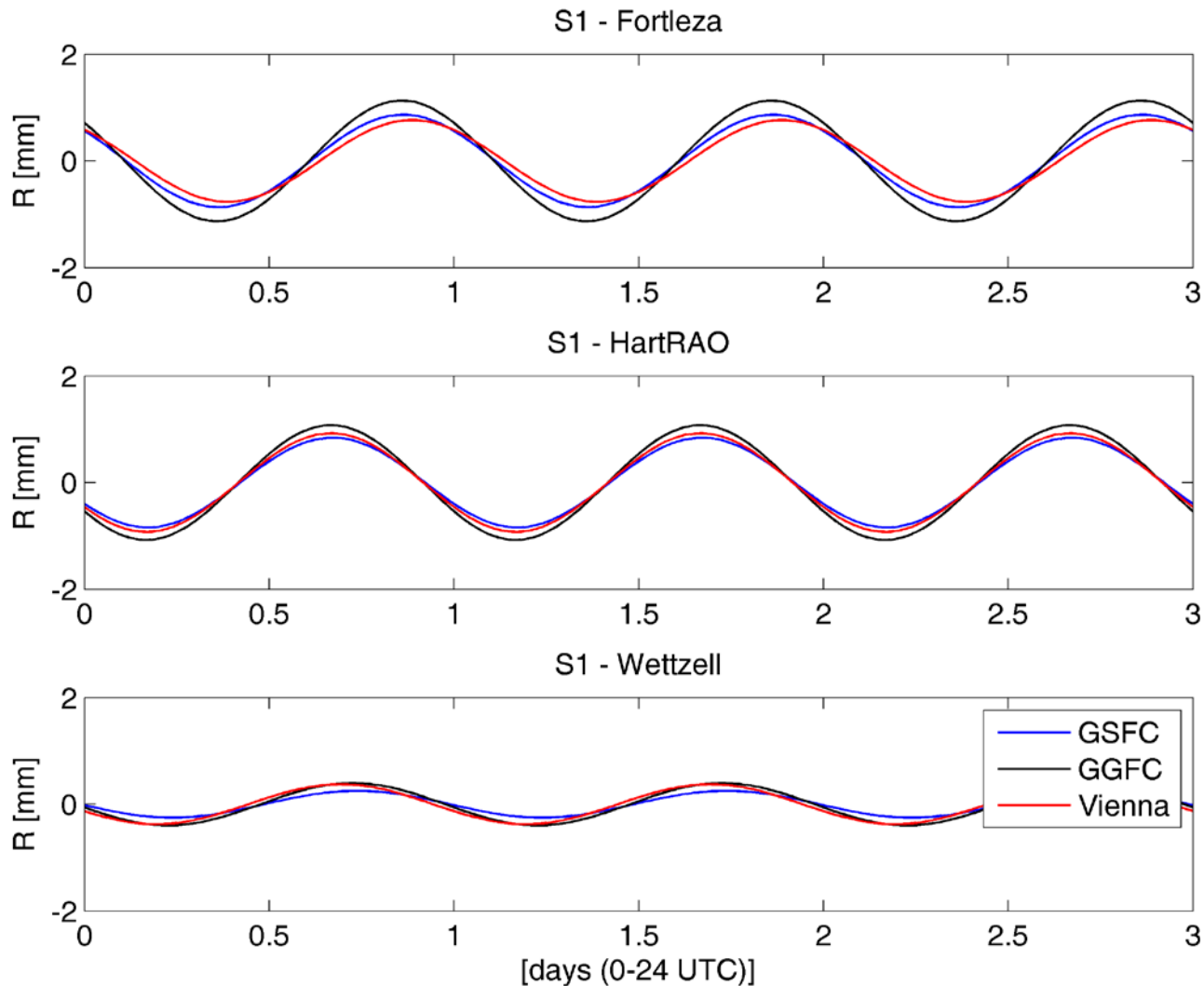
Wijaya et al. 2013

<http://ggosatm.hg.tuwien.ac.at>

- Biancale and Bode

- ...

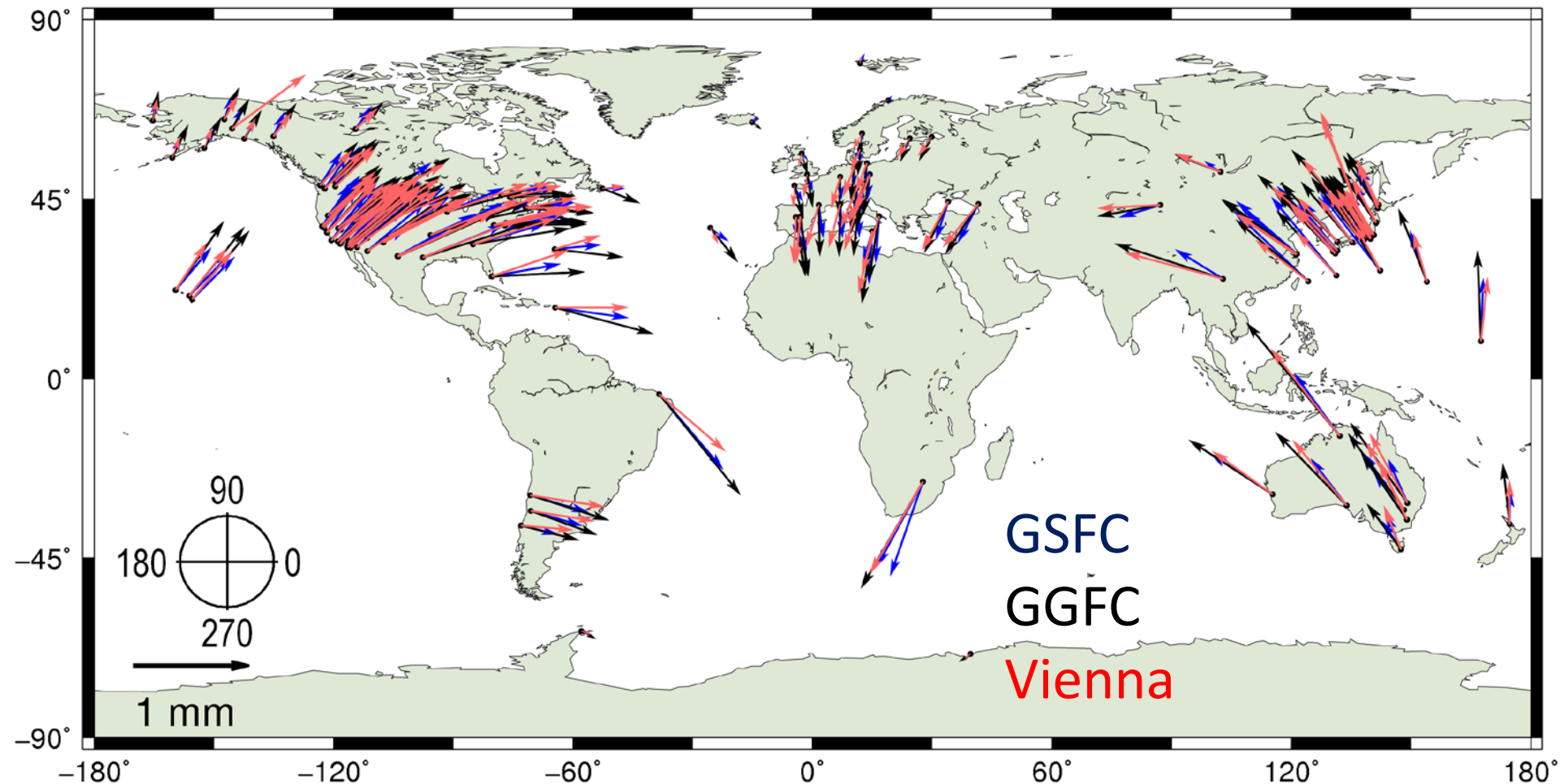
S1 Tidal Loading



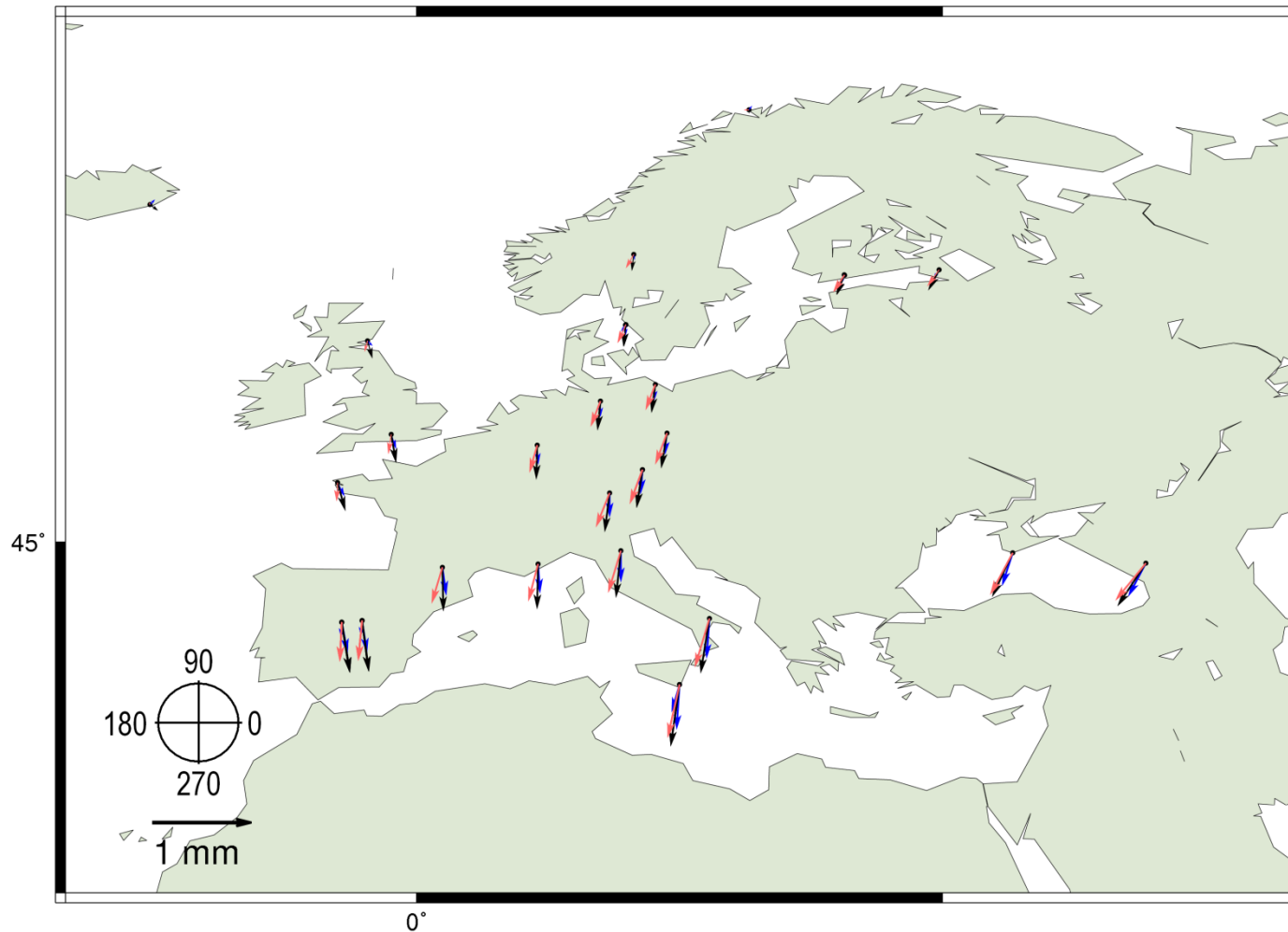
GSFC
GGFC
Vienna

CoM
non-IB

S1 Tidal Loading

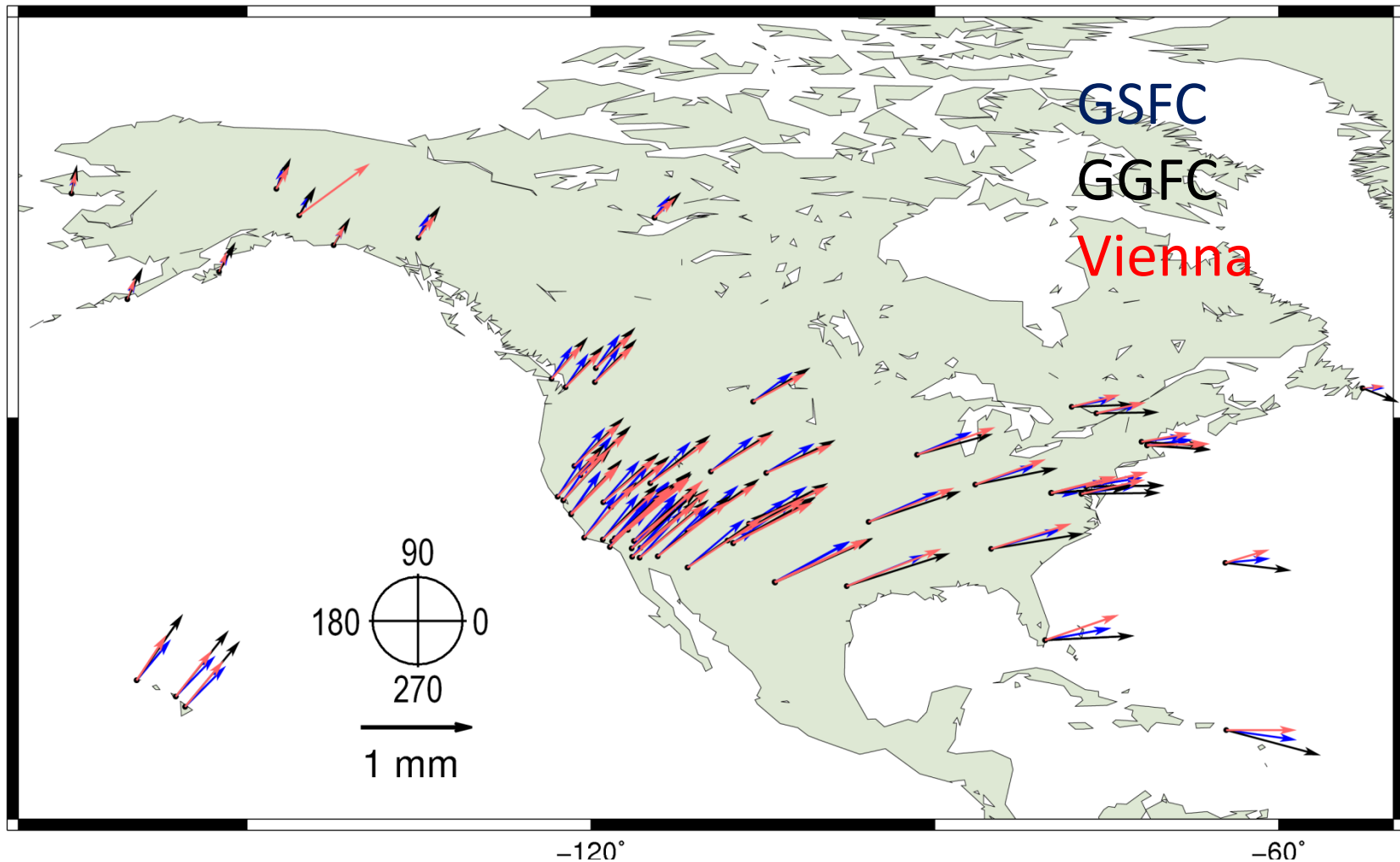


S1 Tidal Loading

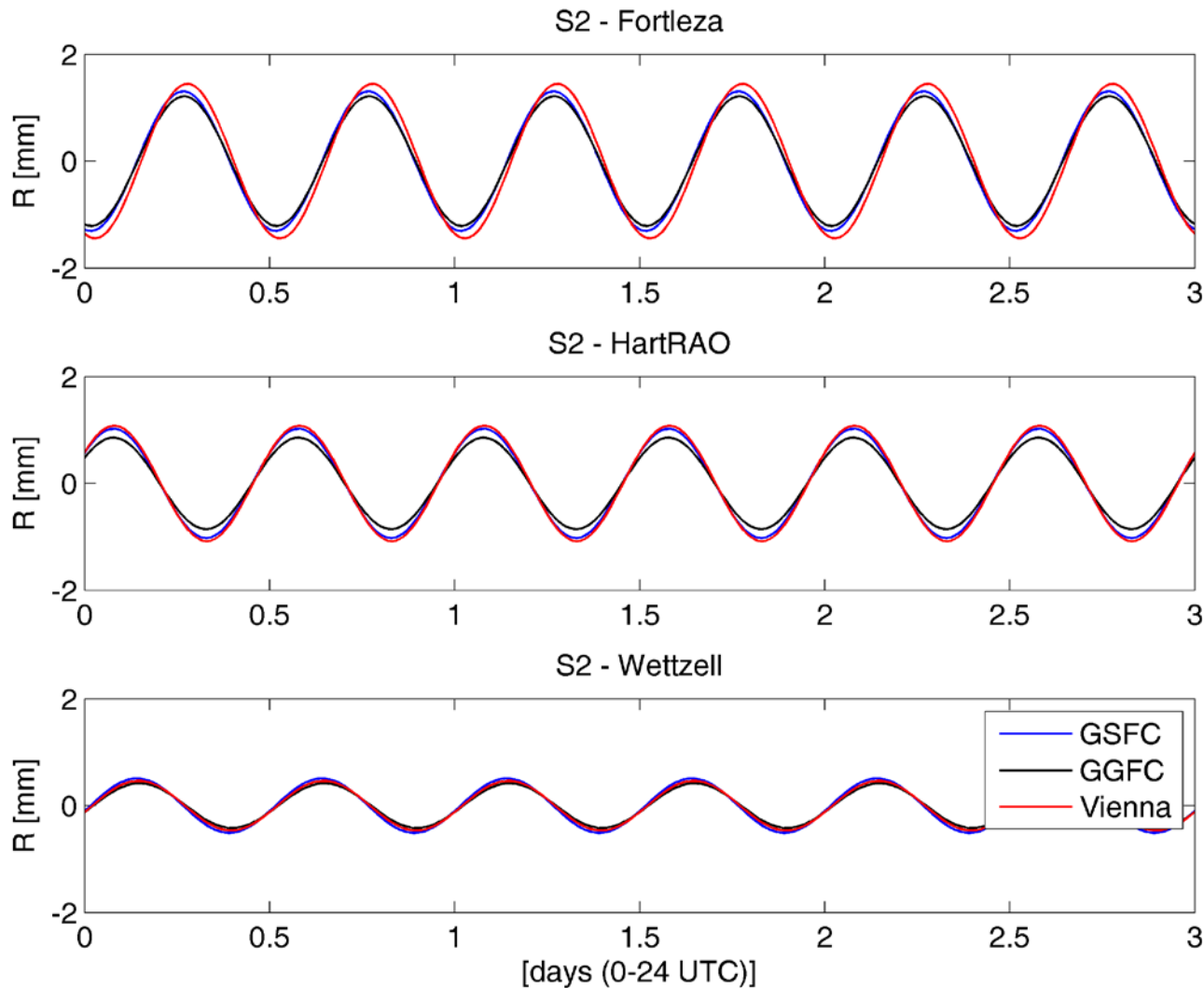


GSFC
GGFC
Vienna

S1 Tidal Loading

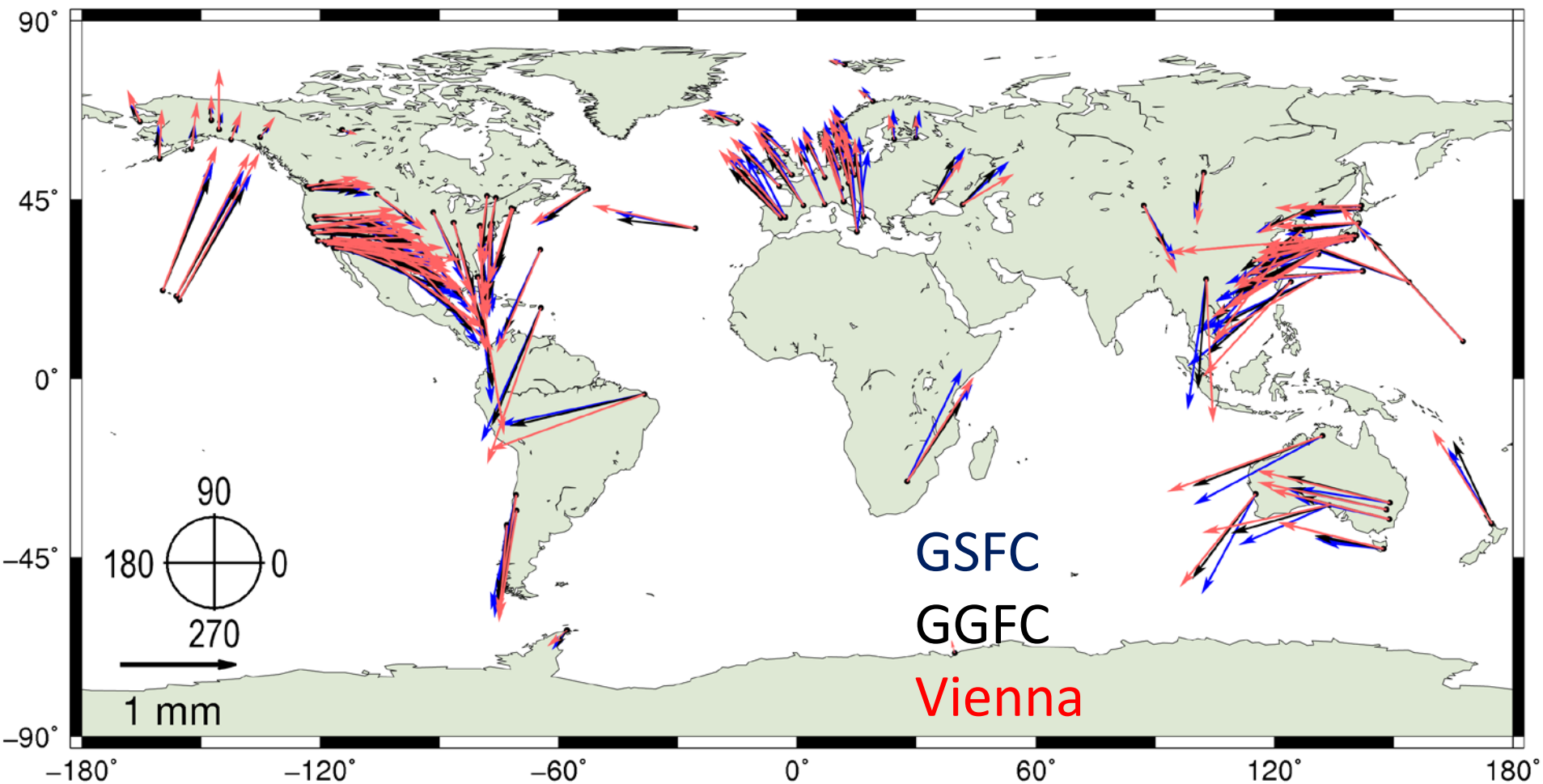


S2 Tidal Loading

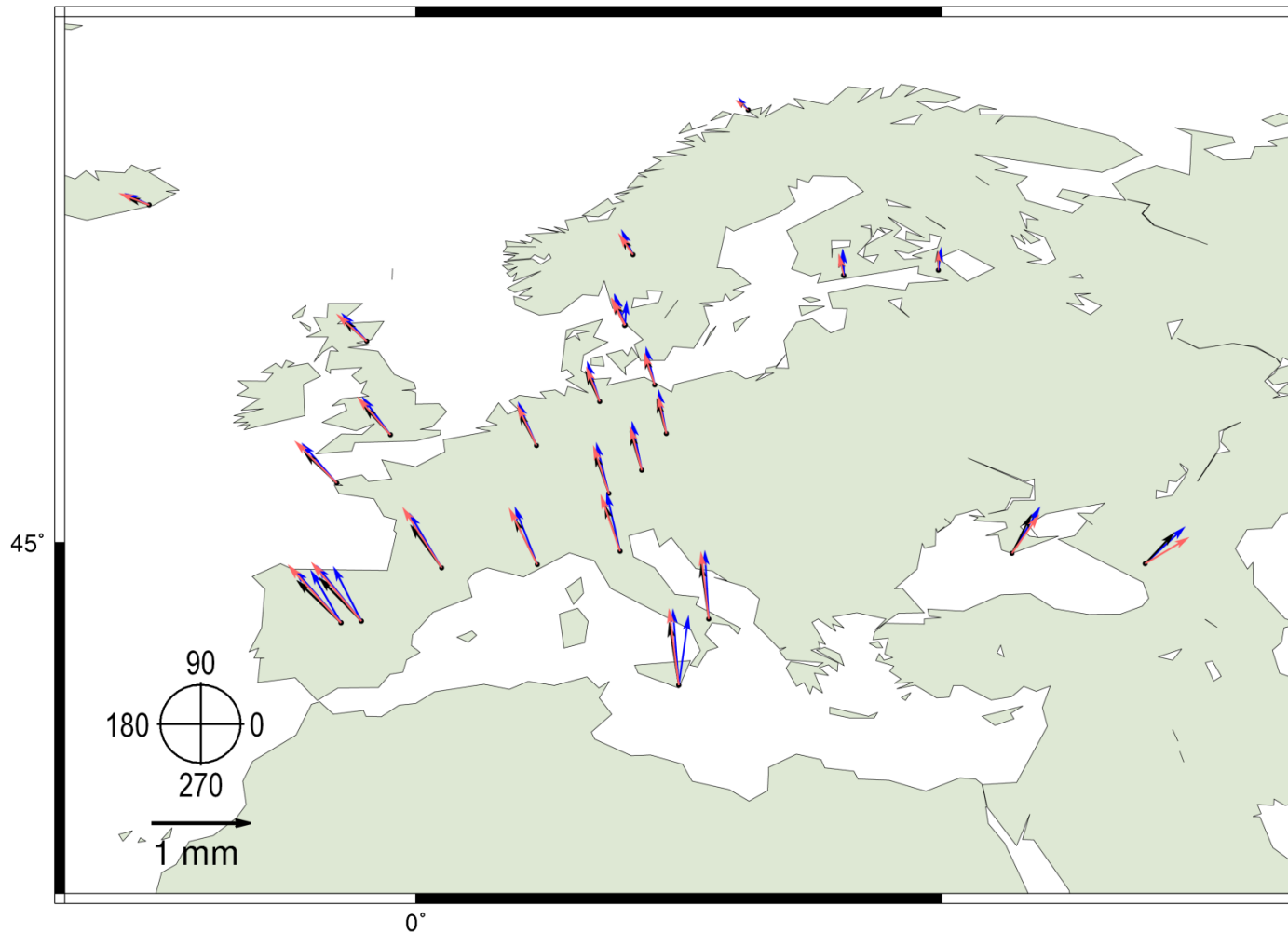


GSFC
GGFC
Vienna

S2 Tidal Loading

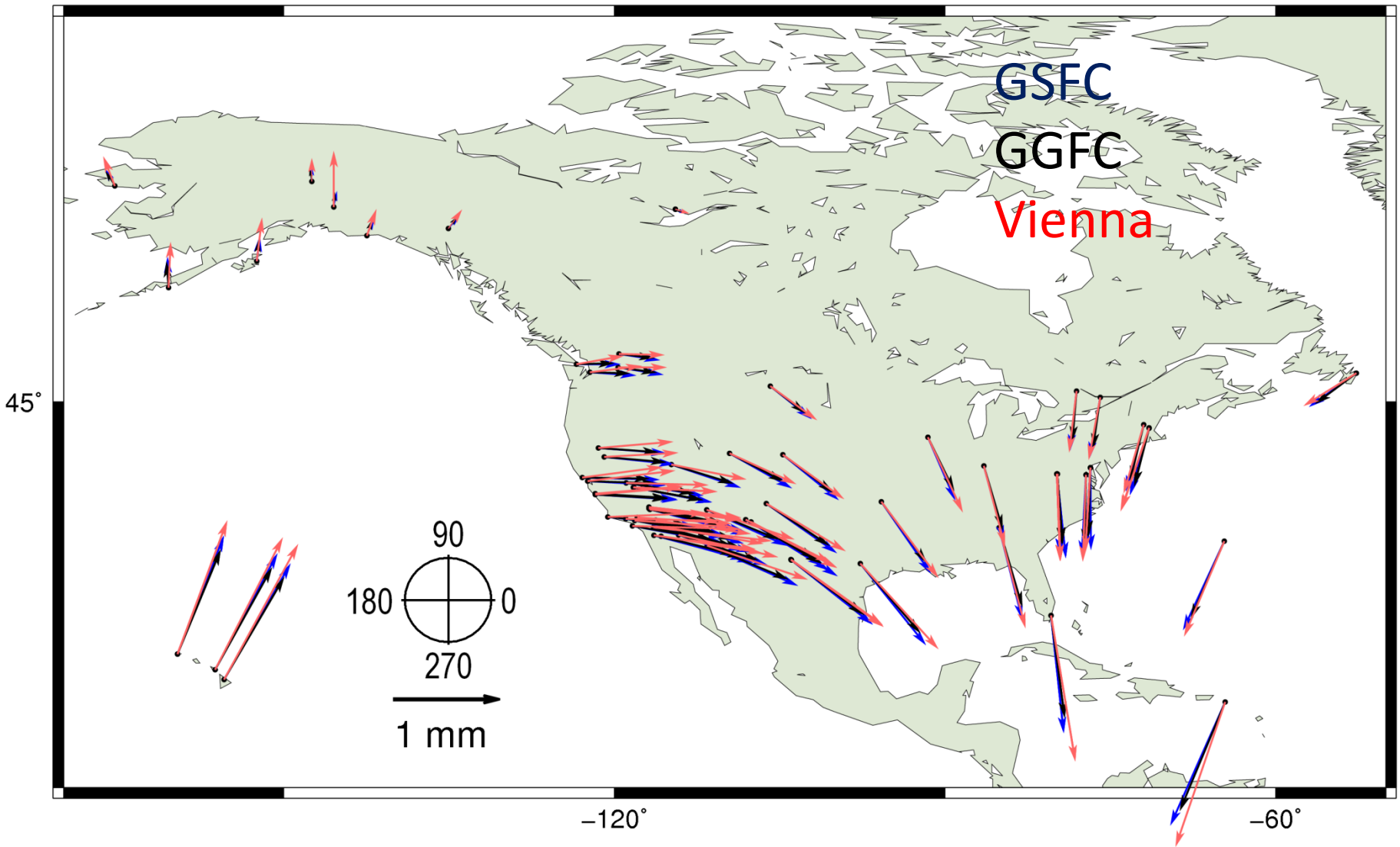


S2 Tidal Loading



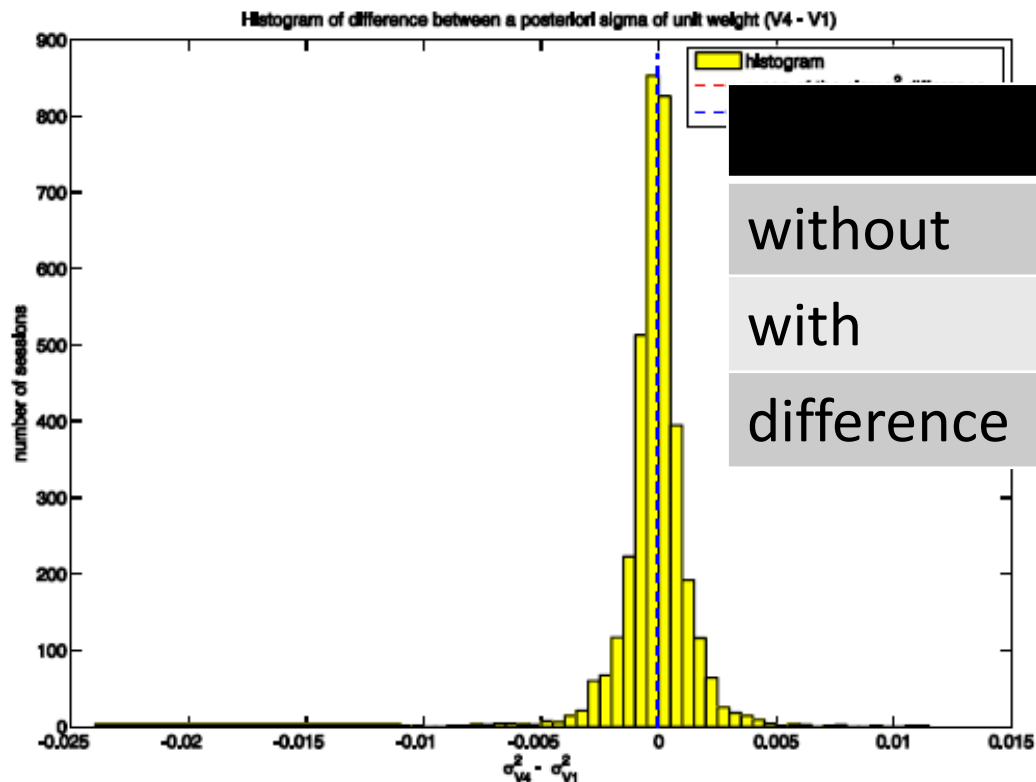
GSFC
GGFC
Vienna

S2 Tidal Loading



VLBI Analysis

- 3581 24h VLBI sessions w/wo Vienna corrections
- Comparison of post-fit residuals with vTPv/dof



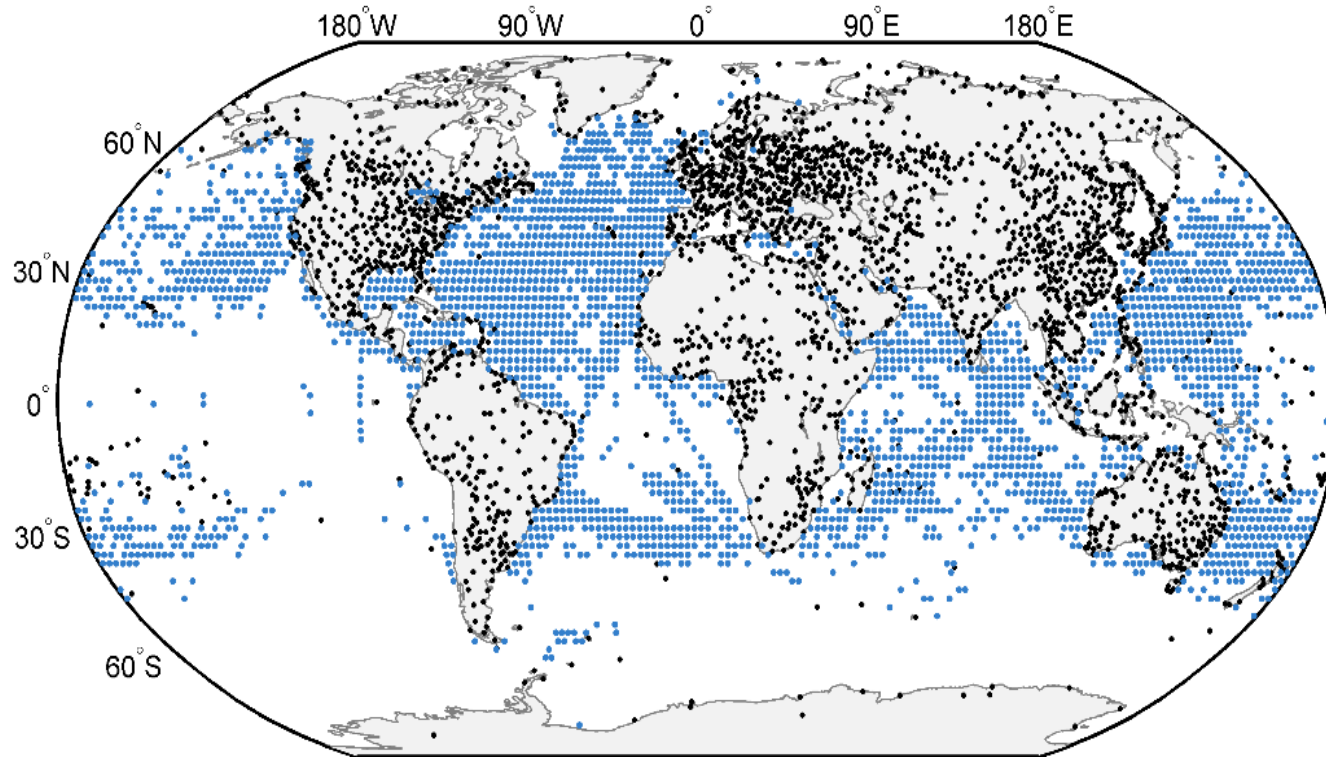
	mean	median
without	1.068354	0.952819
with	1.068259	0.952856
difference	0.000095	-0.000037

VLBI Analysis

- 3581 24h VLBI sessions
- No improvement in terms of baseline length and coordinate repeatabilities

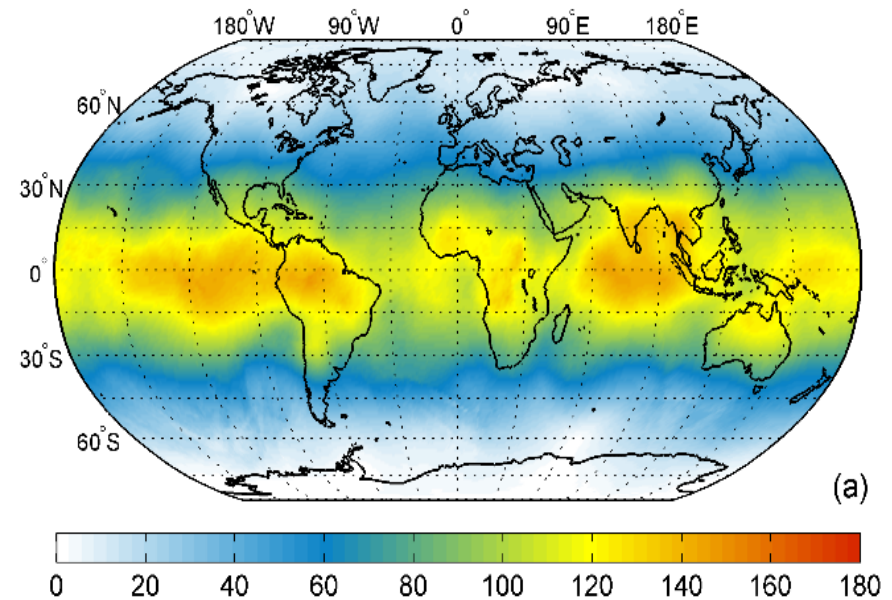
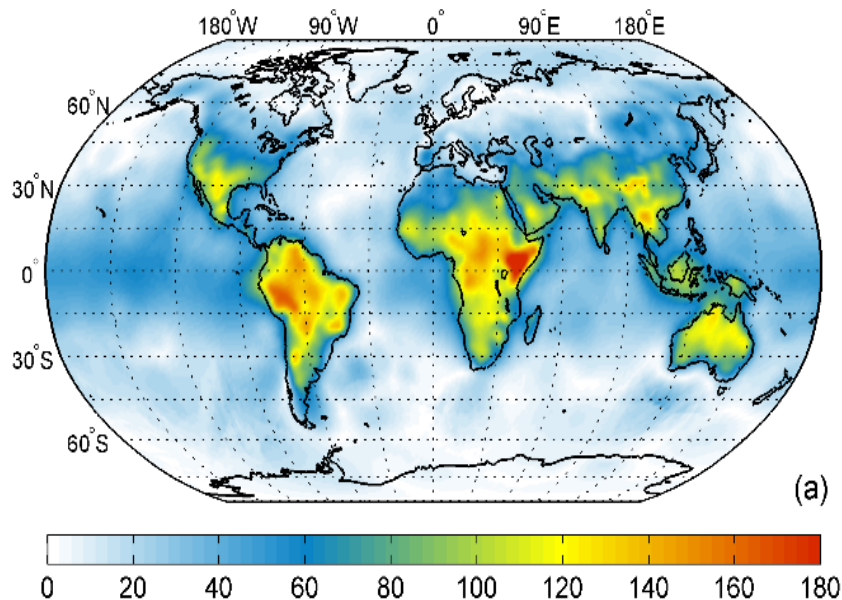
Ongoing Work at TU Vienna

- S1 and S2 pressure tide components derived for 4202 land stations and 2924 ocean boxes (Intern. Surface Pressure Databank 1990-2010)



Ongoing Work at TU Vienna

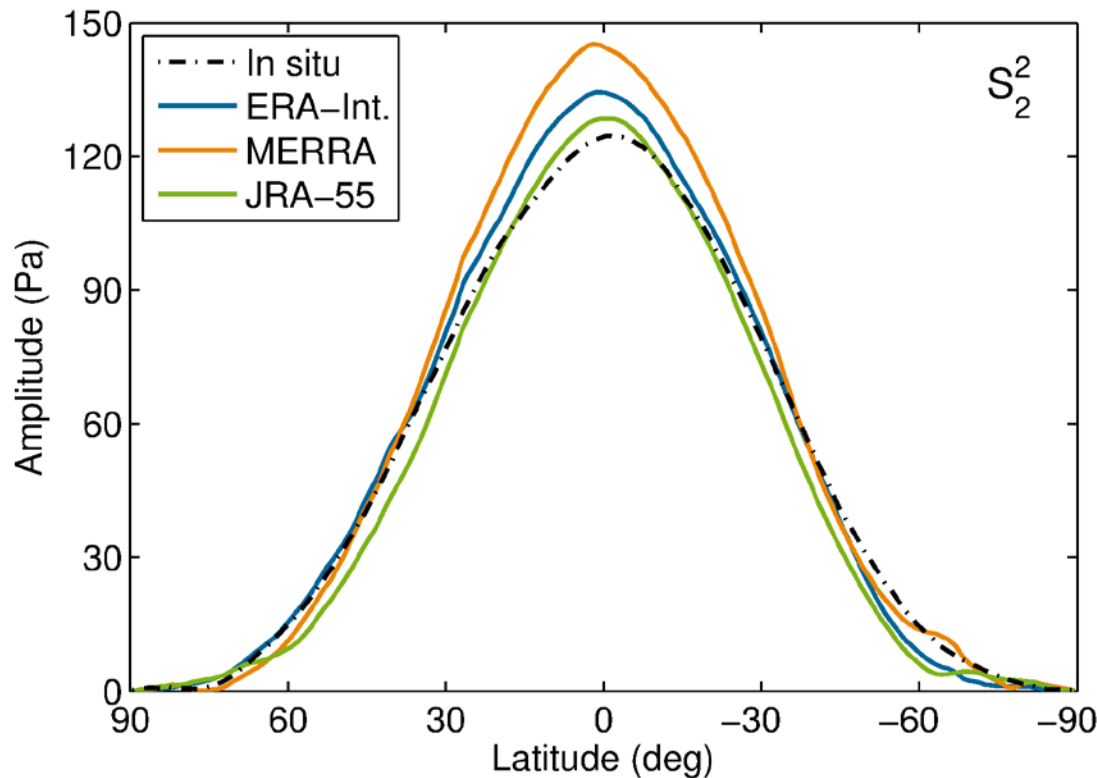
- S1 and S2 estimates interpolated to global 1° degree grids



Schindelegger et al. 2014,
subm.

Ongoing Work at TU Vienna

- Comparison against NWM (S2)



To be done

- Conversion to loading grids and application in (VLBI-) analysis
- Estimation of seasonal modulation of S1 and S2 and addition to loading grids

Conclusions

- Neglecting tidal loading in VLBI analysis does not impact station coordinates
- Tregoning and Watson (2011) found that modelling tidal loading reduces the semiannual draconitic signals in station coordinates
- Standard in gravity solutions
- Ongoing discussion

Tregoning and Watson (2011)

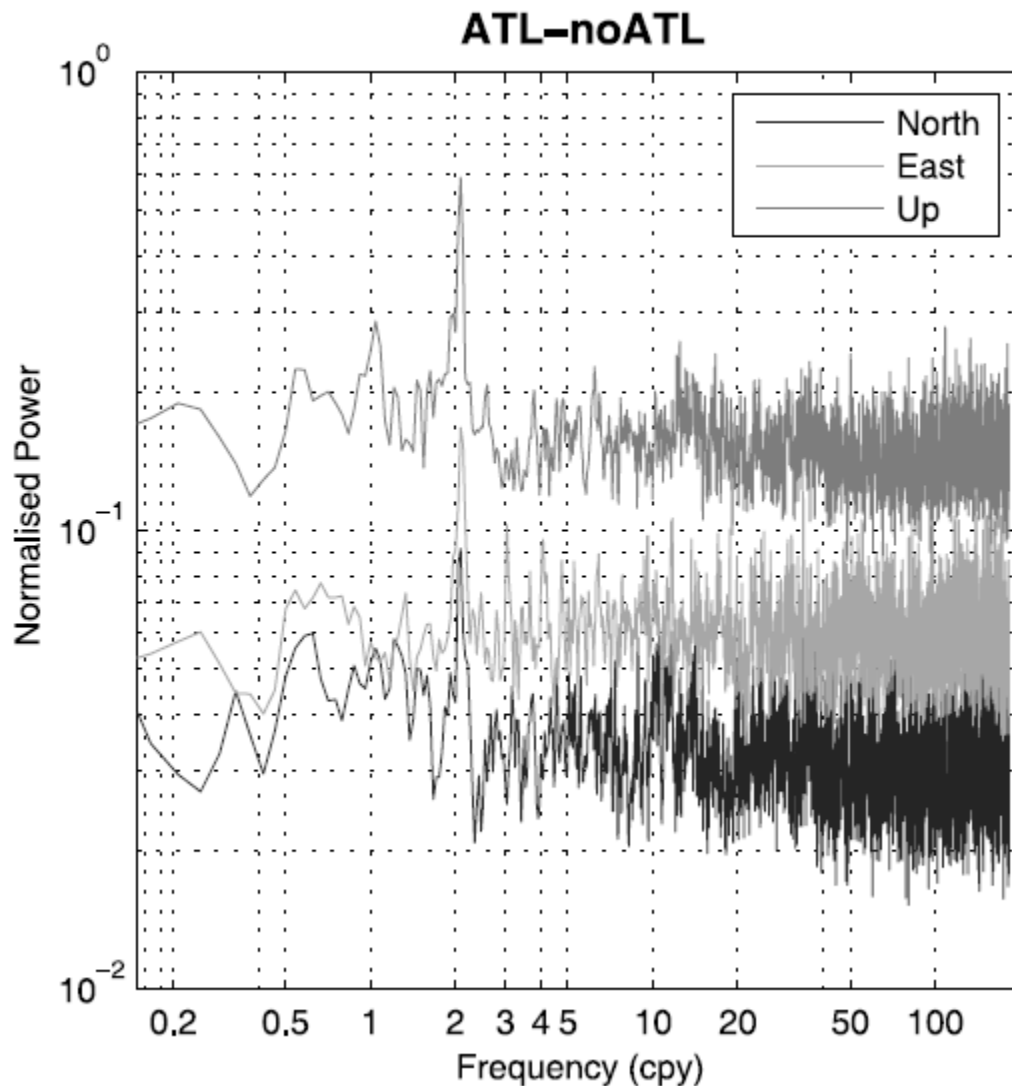


Figure 1. Stacked power spectra of the difference between time series with and without the atmospheric tidal loading deformation correctly accounted for. Note the peak corresponding to frequency of 2 cycles per draconic year (i.e., period ~ 174.5 days). All individual spectra across each component are normalized using a variance of 4 mm^2 .