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## Abstract

The next realisation of the International Terrestrial Reference System, the ITRF2014 (International terrestrial reference frame 2014) is released since beginning of 2016. The VLBI input to ITRF2014 is provided by the International VLBI Service for Geodesy and Astrometry (IVS) and consists of a combination of all analysis center (AC) contributions. One of these single solutions is contributed by the Vienna special analysis center of the Department of Geodesy and Geoinformation at TU Wien (VIE). In this presentation we describe the characteristics of the Vienna contribution (calculated using the Vienna VLBI Software VieVS) to ITRF2014 or VTRF2014, respectively. We give a documentation of the included sessions and stations as well as some statistical information which show the performance of the Vienna contribution compared to the other contributions to the IVS combination. In addition to that, a single solution TRF, VieTRF2014, which is based on the Vienna input to ITRF2014, is presented and compared to a previous TRF solution.



## Vienna VLBI Software

See poster by Madzak et al.: "VieVS 2.3 - status of the Vienna VLBI Software and plans for the future"

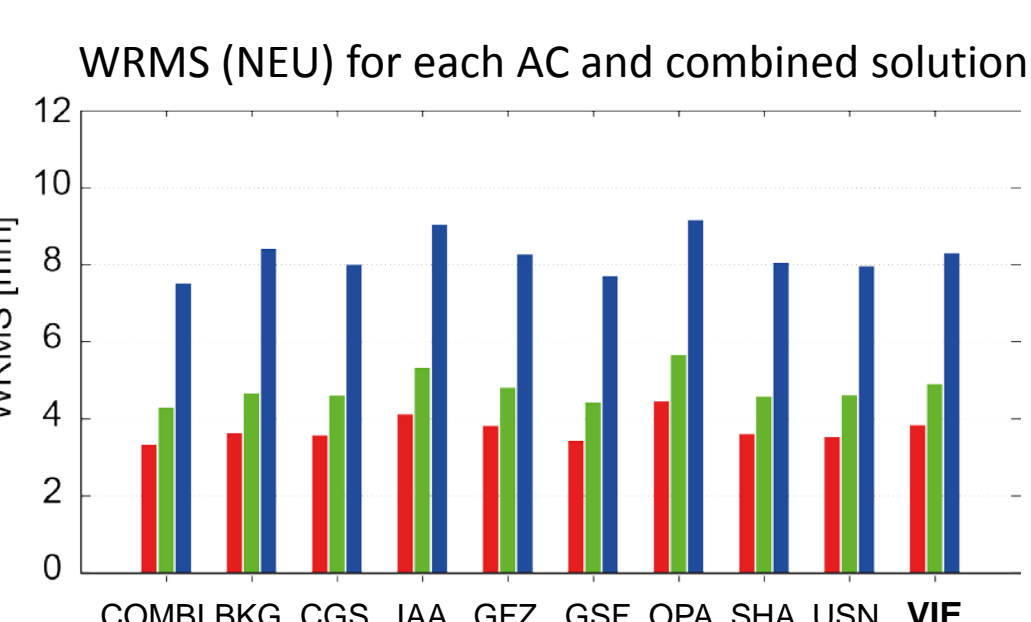
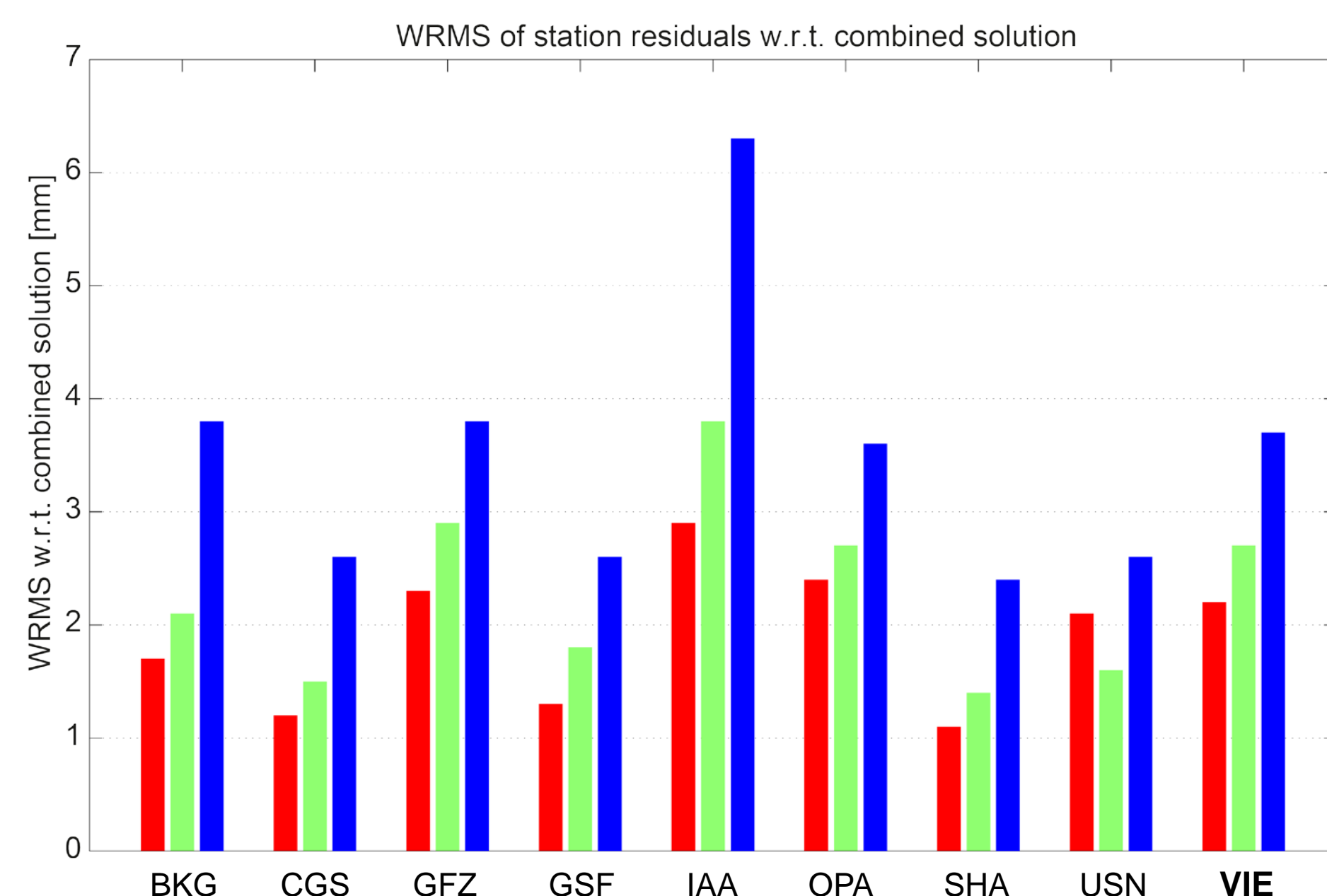
## Standard single session processing settings

	Interval (min)	Relative constraints
Clock	60	1.3 cm after 60 min
Zenith wet delay	60	1.5 cm after 60 min
Troposphere gradients	360	0.05 cm after 360 min
x-pole, y-pole	1440	0.1 $\mu$ s after 1 day
dUT1	1440	0.1 $\mu$ s after 1 day
Celestial pole offsets	1440	0.1 $\mu$ s after 1 day
Station models	According to IERS Conventions 2010 + non-tidal atmospheric loading (Vienna)	

## Vienna contribution to IVS combination

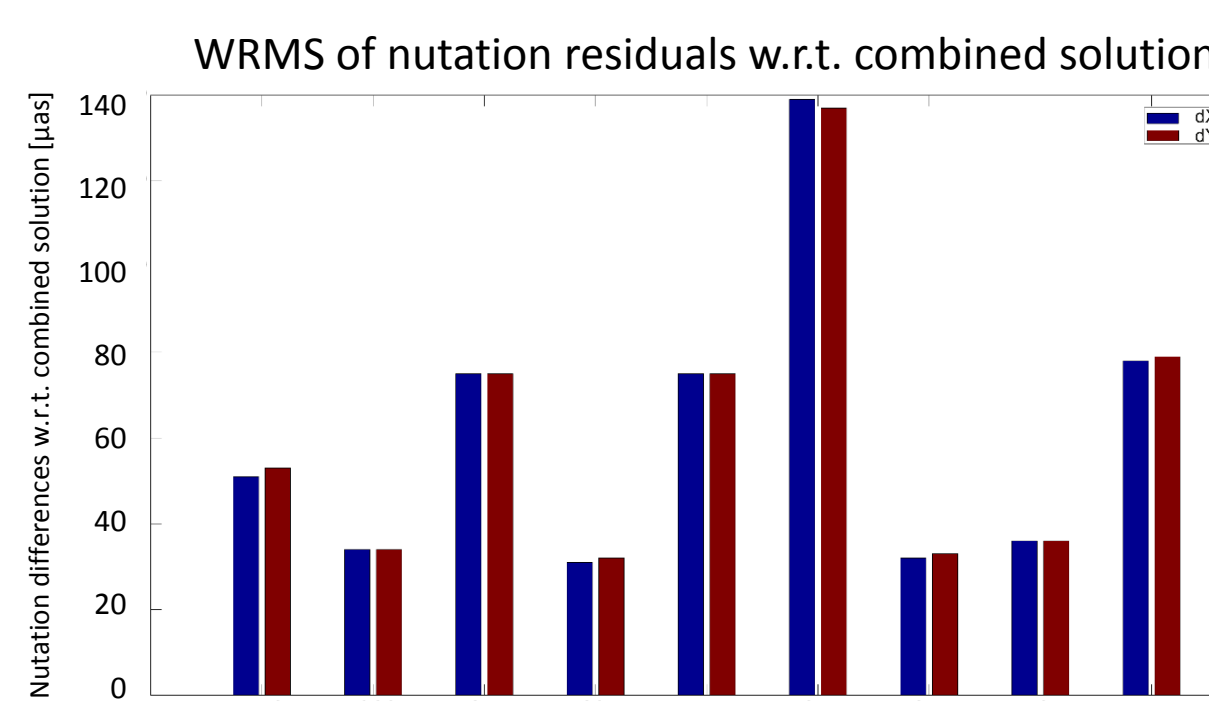
### SINEX file statistics

Number of sessions (submitted/used)	Number of stations	Time span
5602/4659	145	1979.7-2015.0



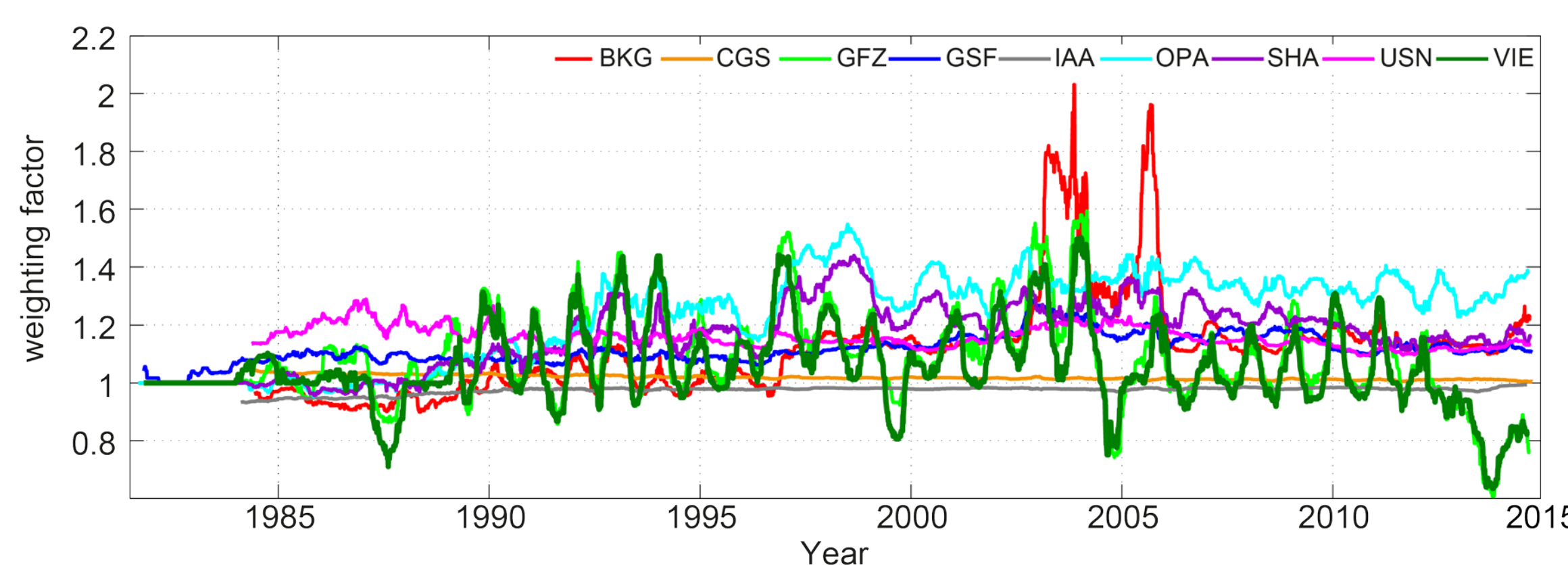
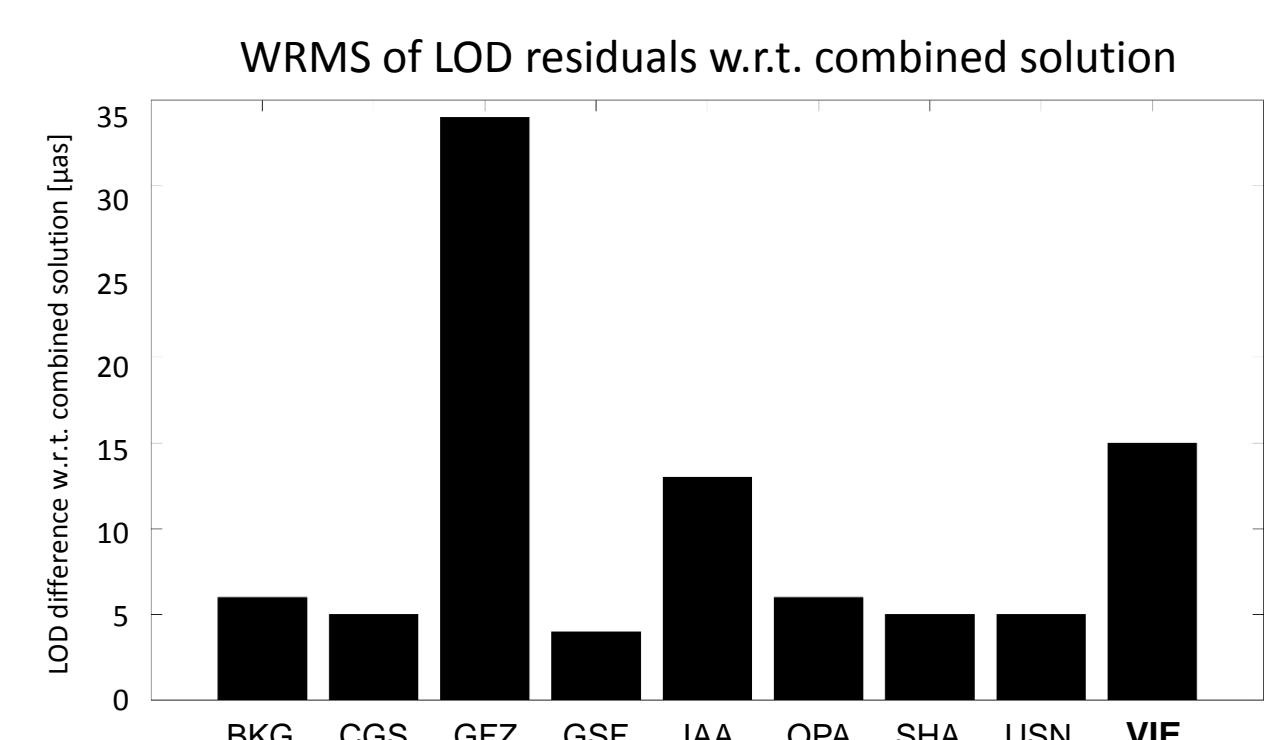
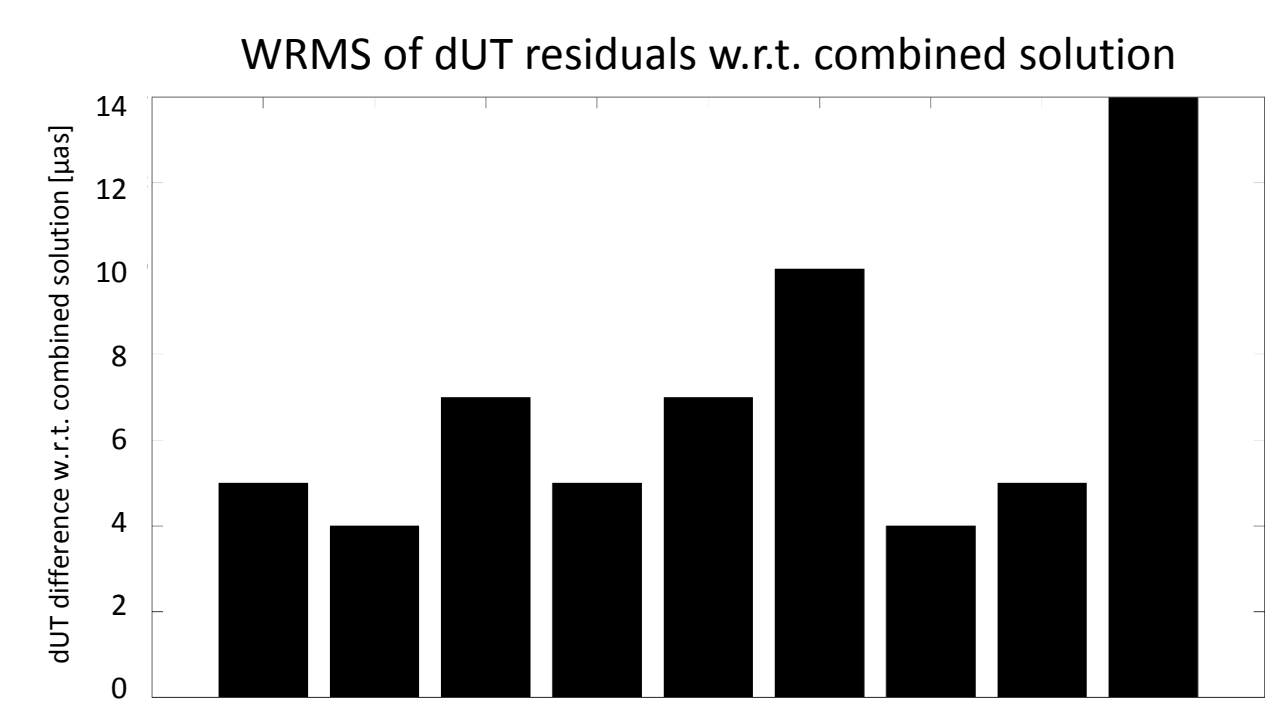
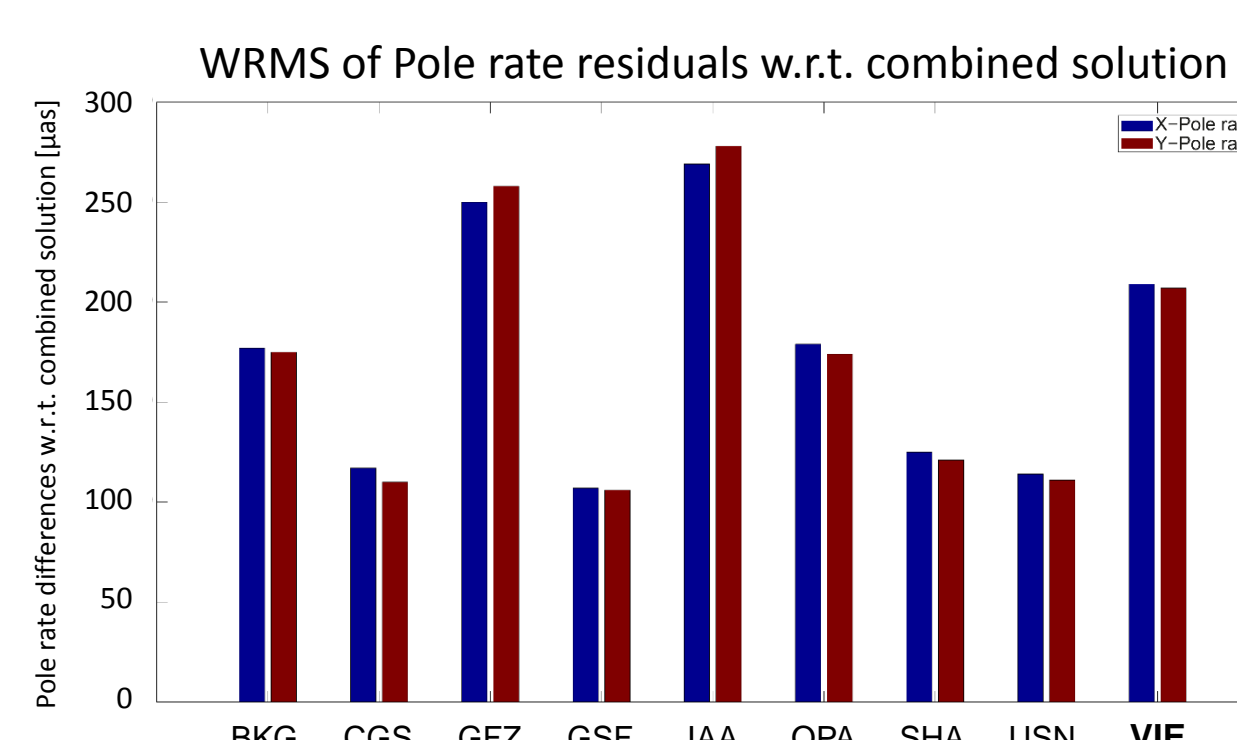
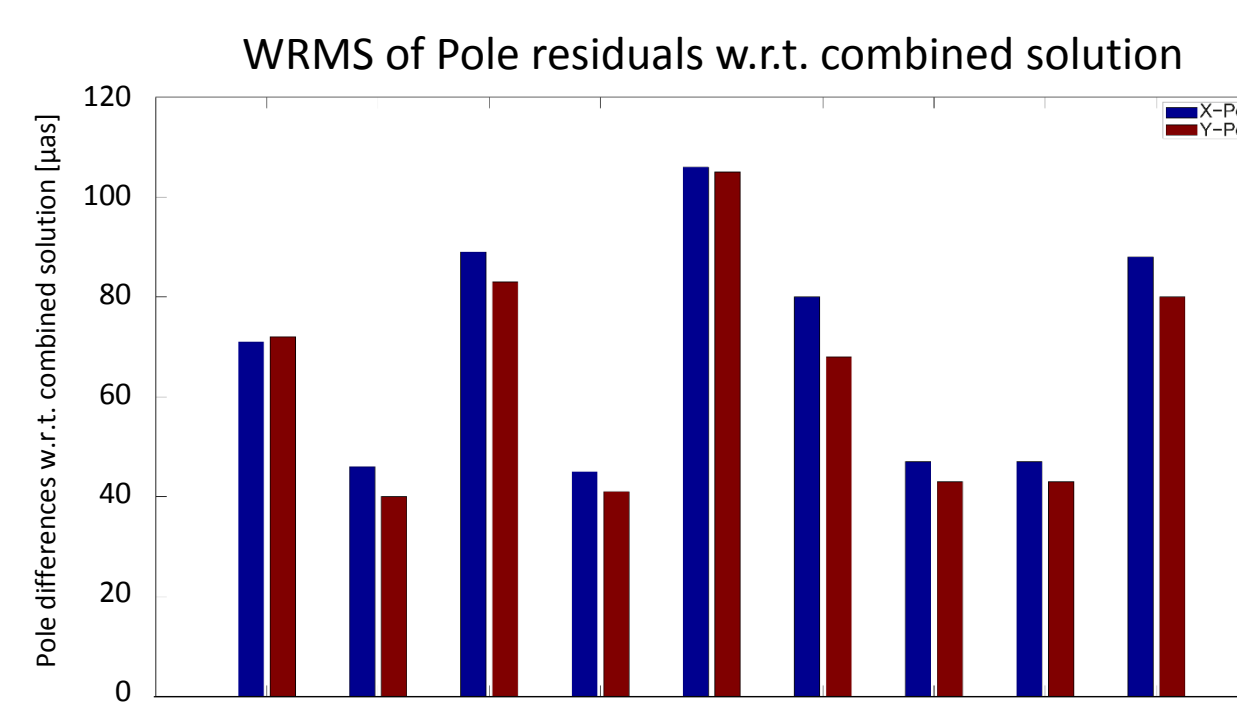
### Station positions

The general WRMS for all stations for each AC and the combined solution is calculated from session-wise site positions (North, East, Up).



### Earth orientation parameters (EOP)

EOP are estimated session-wise with fixed station coordinates. In contrast to other ACs, VIE delivered EOP parameterised as offsets, instead of offset and rate. The transformation of the normal equations to the standard parametrisation might cause the large differences in dUT1.

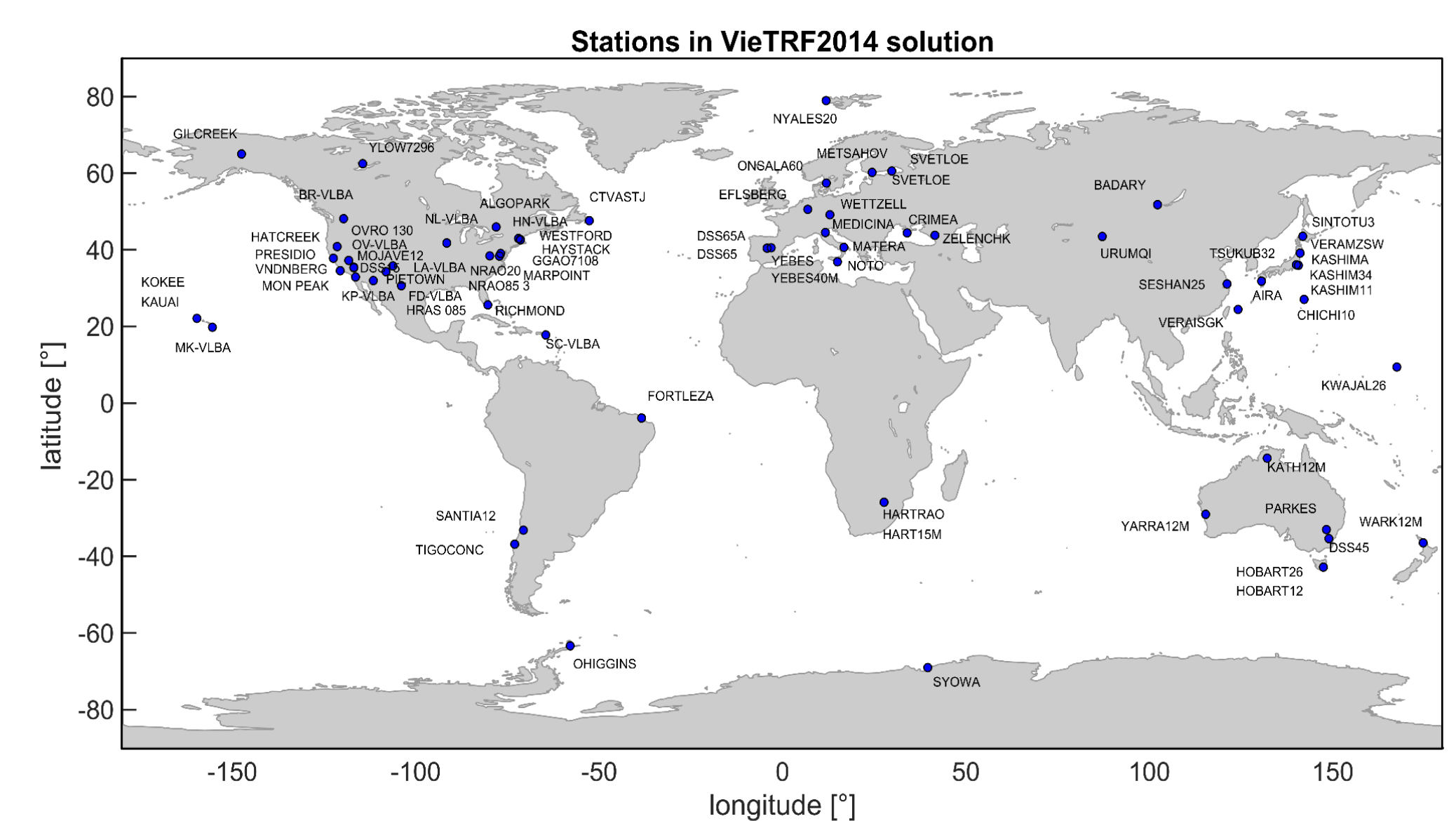
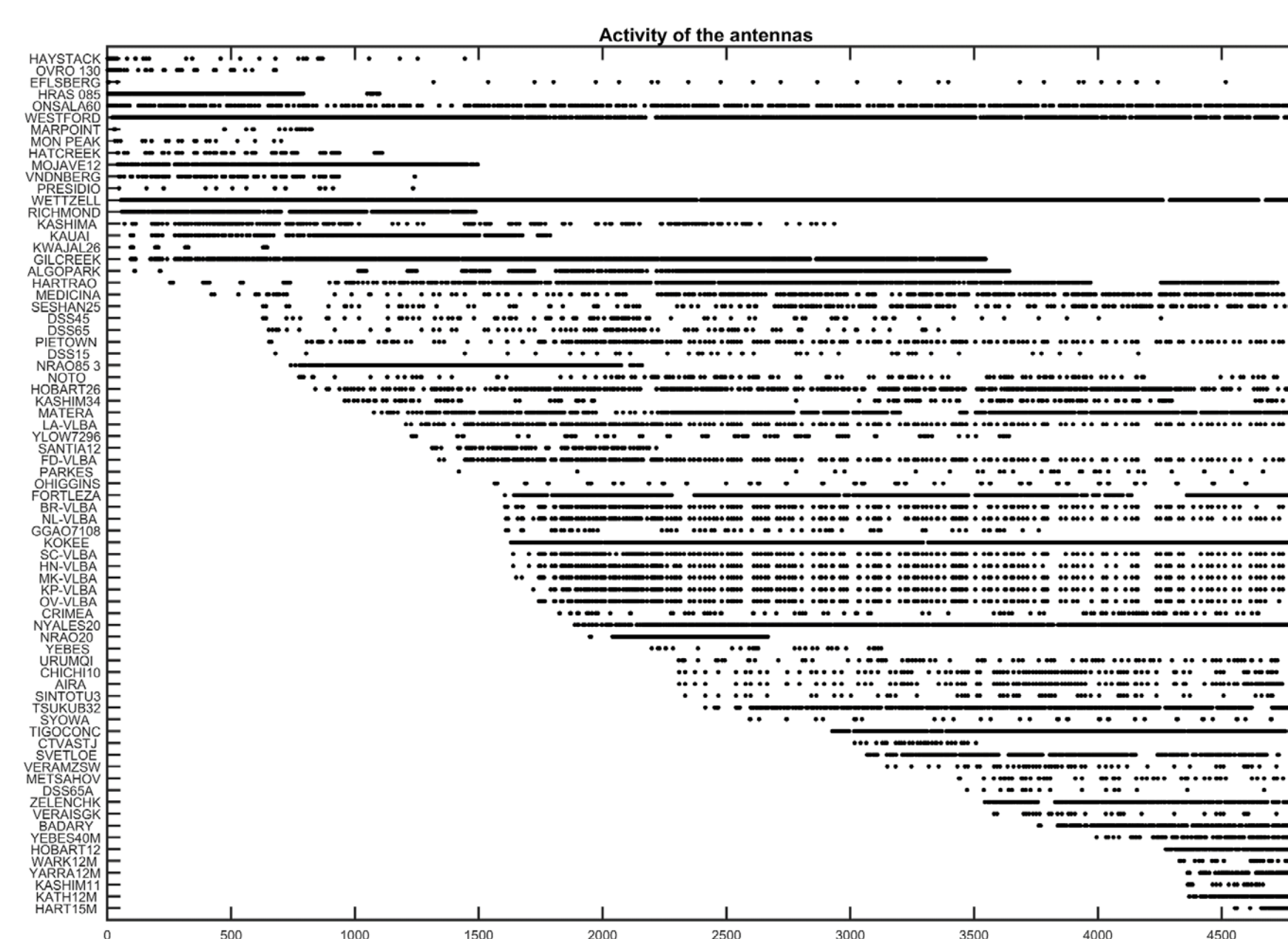


### Weighting factors

For the combination all individual normal equations are rescaled by a variance factor. These weighting factors for the ACs are estimated by means of variance component estimation. The factor for VIE AC is closely aligned to the factor for GFZ AC, due to the fact that both use VieVS for data analysis. For more information about the weighting strategy refer to presentation by Bachmann et al. on March 16<sup>th</sup> in session 5.

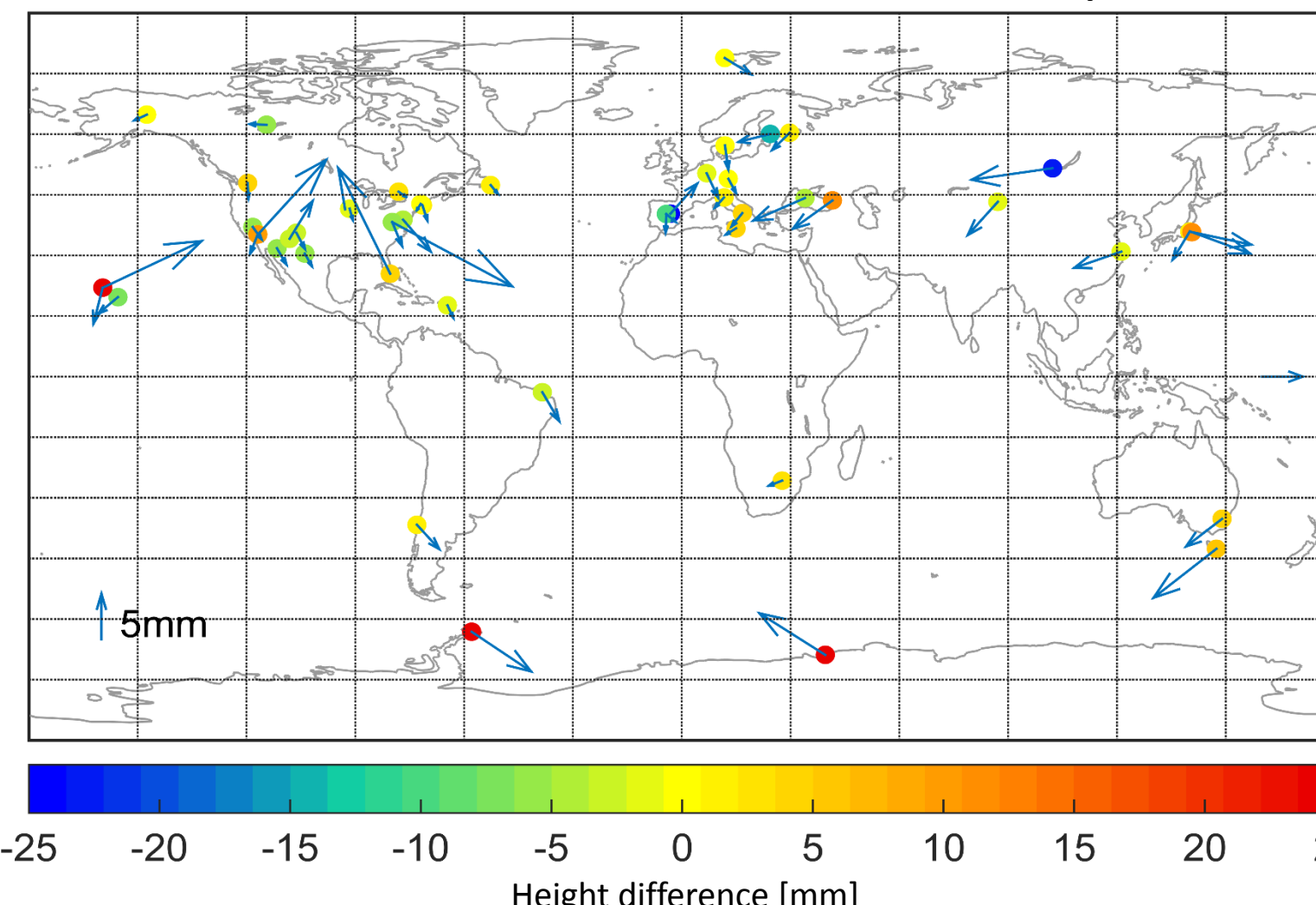
## Vienna TRF solution VieTRF2014a

- 4834 sessions (1979.7 – 2015.0)
  - with > 2 stations, > 200 observations
  - $\sigma_0$  a posteriori < 3
  - badly conditioned sessions removed
- TRF solution characteristics
  - Estimated parameters: station positions, station velocities
  - Fixed parameters: Source positions (ICRF2)
  - Reduced parameters: clocks, zenith wet delays, troposphere gradients, Earth orientation parameters
  - NNR/NTT condition on coordinates of VTRF2008 (23 stations)
  - Stations observing in < 20 sessions and < 2 years are reduced



Weighted Helmert parameters from VieTRF2014a to VTRF2008 (epoch 2000.0)							
Tx [mm]	Ty [mm]	Tz [mm]	Rx [mas]	Ry [mas]	Rz [mas]	Scale [ppb]	
dTx [mm/year]	dTy [mm/year]	dTz [mm/year]	dRx [ $\mu$ s/year]	dRy [ $\mu$ s/year]	dRz [ $\mu$ s/year]	Scale rate [ppb/year]	
*	2.28	1.60	-2.72	-0.03	0.04	0.02	0.26
	$\pm 0.72$	$\pm 0.70$	$\pm 0.67$	$\pm 0.03$	$\pm 0.03$	$\pm 0.02$	$\pm 0.10$
	-0.18	0.01	-0.26	0.49	-2.73	-5.66	0.01
	$\pm 0.24$	$\pm 0.24$	$\pm 0.23$	$\pm 9.35$	$\pm 9.52$	$\pm 7.28$	$\pm 0.03$
**	2.16	1.06	-3.17	-0.01	0.04	0.01	0.29
	$\pm 2.91$	$\pm 2.83$	$\pm 2.70$	$\pm 0.11$	$\pm 0.11$	$\pm 0.09$	$\pm 0.40$
	-0.13	-0.09	-0.31	3.96	-1.57	-5.02	0.01
	$\pm 0.99$	$\pm 0.96$	$\pm 0.94$	$\pm 37.87$	$\pm 38.59$	$\pm 29.54$	$\pm 0.14$

Position differences between VieTRF2014 and VTRF2008 at epoch 2000.0\*



### Comments

VieTRF2014a is a preliminary solution and will be refined in terms of datum definition and handling of stations where Earth quakes occurred. It is also planned to estimate future TRF solutions simultaneously to the Vienna CRF solution (See presentation by Mayer et al., "Vienna contribution to the ICRF3" on March 17).

## References

The plots of section „Vienna contribution to IVS combination“ are partly included in Bachmann et al. (2016), „IVS contribution to ITRF2014“, submitted to Journal of Geodesy.

Böhm, J., Böhm, S., Nilsson, T., Pany, A., Plank, L., Spicakova, H., Teke, K., Schuh, H. (2012). The new Vienna VLBI Software VieVS, in Proceedings of IAG Scientific Assembly 2009, International Association of Geodesy Symposia Series Vol. 136, edited by S. Kenyon, M. C. Pacino, and U. Marti, pp. 1007-1011.