

# Vienna SAC-SOS: ANALYSIS OF THE EUROPEAN VLBI SESSIONS



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## Abstract

The Institute of Geodesy and Geophysics (IGG) of the Vienna University of Technology as an IVS Special Analysis Center for Specific Observing Sessions (SAC-SOS) has analysed the European VLBI sessions with the software VieVS. Since 1990, 113 experiments have been carried out and all of them proved to be of high quality. The analysed baselines have lengths ranging from approx. 445 to 4580 km and showed good repeatabilities apart from the ones containing the station Simeiz. The station velocities have also been investigated. The stations situated in the stable part of Europe have not shown significant movements with respect to Wettzell whereas the stations located in the northern areas present the largest vertical motions as a result of the post glacial isostatic rebound of the zone. The stations placed in Italy, around the Black Sea, Siberia, and the Arctic Circle show the largest horizontal motions with respect to Wettzell because they belong to different geodynamical units.

## European Geodetic VLBI Network

Since 1990, 113 European geodetic VLBI network experiments have been carried out (last one, Nov. 2011, still not correlated). Their purpose is to determine the station coordinates and their evolution. The network consists of 16 stations from which an average of 7 are observing per session.

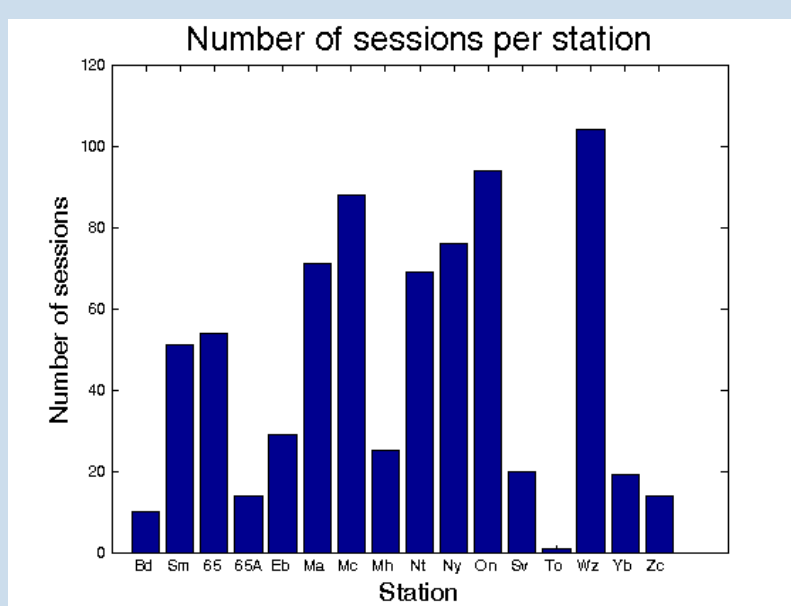


Fig. 1. Number of sessions in which every station was participating

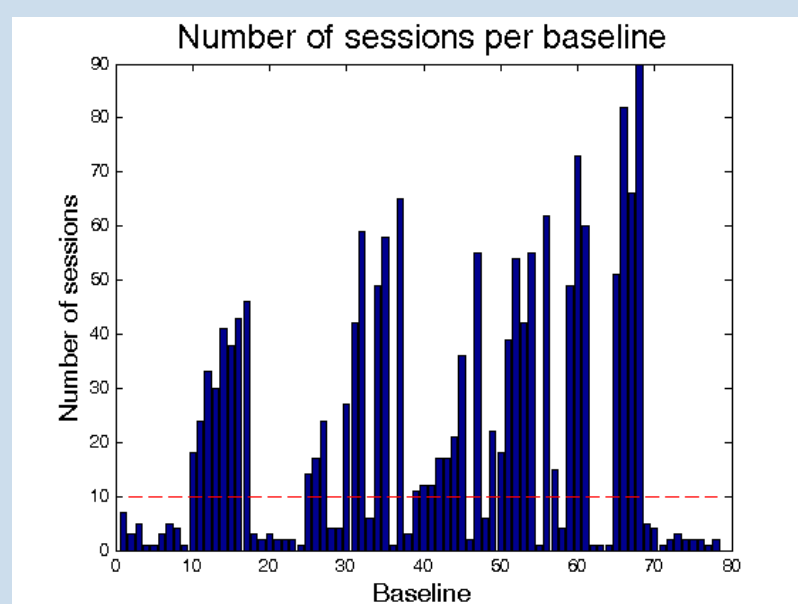


Fig. 2. Number of sessions in which every baseline was participating

All sessions could be used in this work ( $\chi^2 < 1.5$  in all of them). From a total of 78 observed baselines only 40 were used in this analysis as they were observed in more than 10 sessions.

## Repeatabilities

The 40 baselines used in this work have lengths ranging from approx. 445 to 4580 km. Figure 3 shows the repeatabilities of the baseline length measurements. It is noticeable that baselines that contain the station Simeiz have worse repeatabilities than other baselines. Baseline Effelsberg-Wettzell also presents a higher standard deviation than expected.

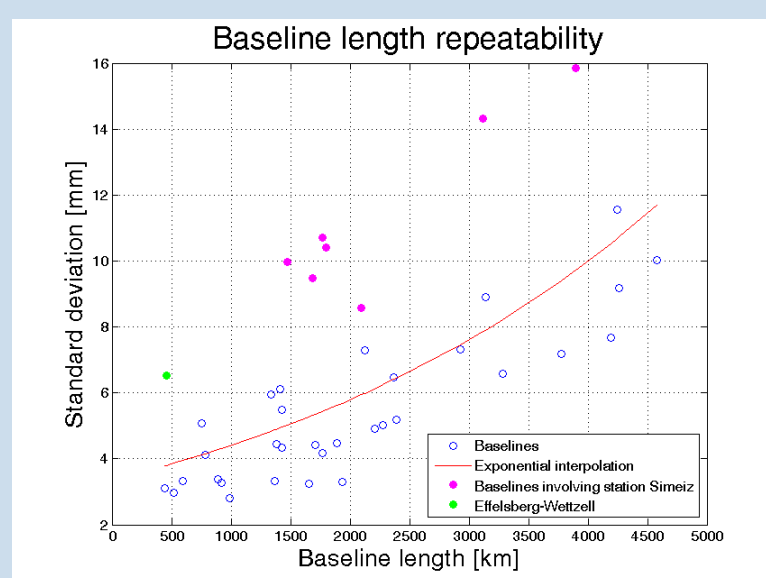


Fig. 3. Baseline length repeatability

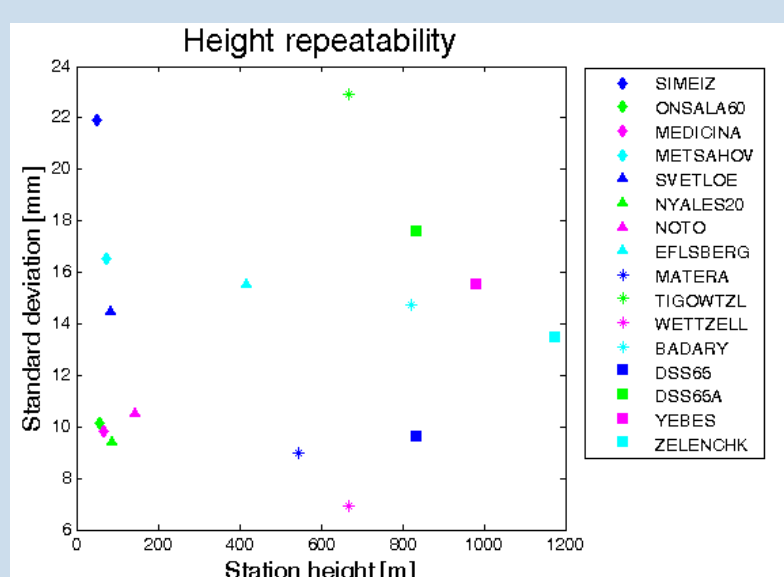


Fig. 4. Height repeatability

The repeatability of the vertical coordinates of the stations has also been studied. Figure 4 shows that there is no relationship between the vertical coordinate of a station and its standard deviation. It should be mentioned here that we used NNR/NTT conditions on VTRF2008 for all stations of a session.

## Station velocities

In this work, the station velocities have been calculated (Fig. 5, arrows are corresponding to horizontal motion, the colored circles represent vertical movements). All stations present a similar horizontal movement in direction NE which corresponds to the movement of the Eurasian plate. Figure 6 shows the station velocities with respect to Wettzell (situated in the stable part of Europe and in the center of the network). The results obtained here agree with the ones obtained by Haas et al. (2000). The stations Madrid, Yebes and Effelsberg do not show significant shifts as they are situated on the same geodynamical unit as Wettzell, while the Italian stations present substantial displacements in the North-East direction due to the motion of the African plate with respect to the Adriatic plate. The movements of the northern stations (Ny Ålesund, Onsala, Metsähovi and Svetloe) might be a result of the post glacial isostatic rebound of the area. Station Badary, which is quite far away from the other stations shows a different behaviour.

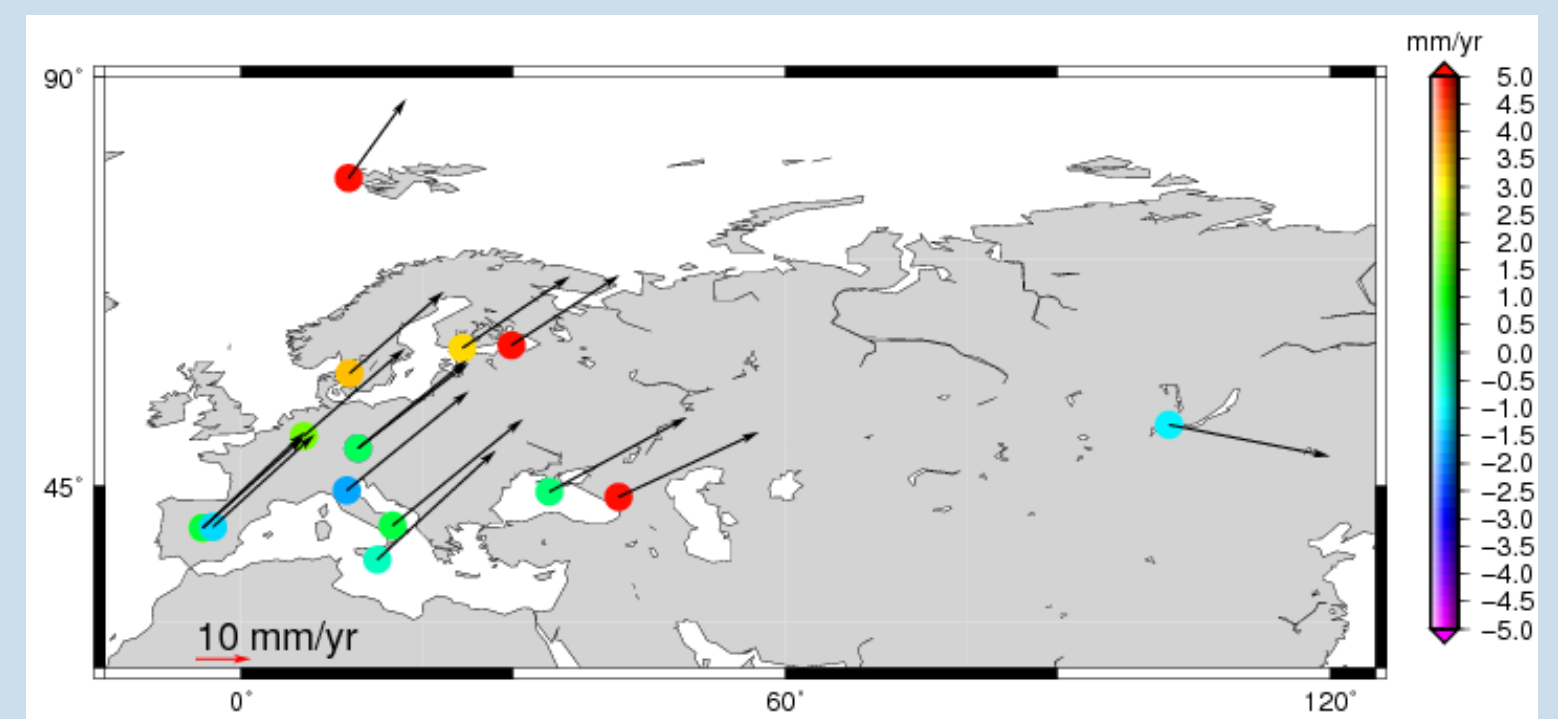


Fig. 5. Station velocities, arrows are corresponding to horizontal motion, the colored circles represent vertical movements

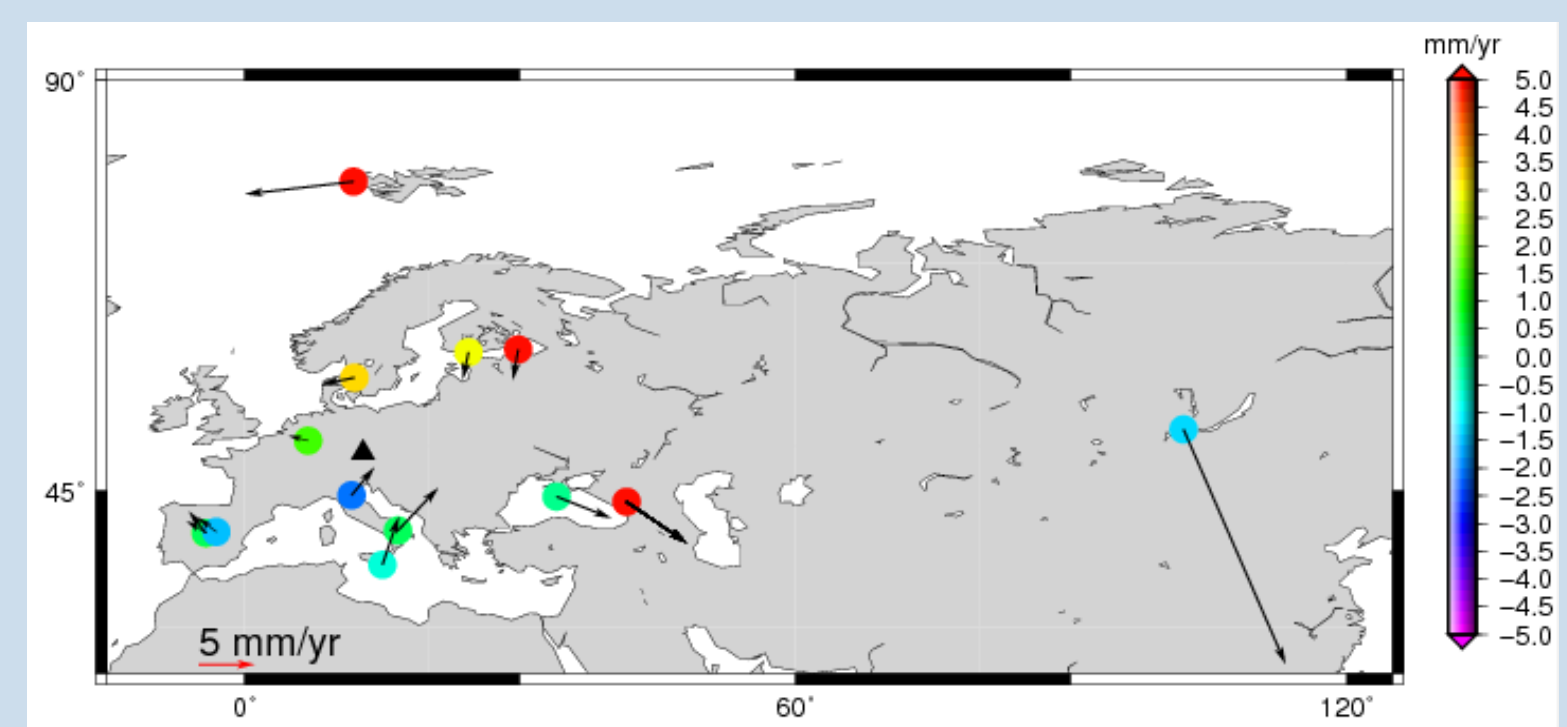


Fig. 6. Station velocities with respect to Wettzell, arrows are corresponding to horizontal motion, the colored circles represent vertical movements

## References

R. Haas et al., Crustal motion results derived from observations in the European geodetic VLBI network. In *Earth Planets Space* 52, pages 759-764. 2000

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