Vienna IGG Special Analysis Center Annual Report 2001

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Abstract

A short overview about the Institute of Geodesy and Geophysics (IGG) at the University of Technology, Vienna, is given and its activities as an IVS Special Analysis Center are described. Topics currently worked on and future plans are described.

1. General Information

The Department of Advanced Geodesy at the Institute of Geodesy and Geophysics (IGG) is part of the University of Technology, Vienna. It was accepted as an IVS Special Analysis Center in December 2000.

Figure 1. **University of Technology, Vienna**

2. Component Description

As a Special Analysis Center, IGG concentrated in 2001 on atmospheric researches (tropospheric and ionospheric path delays) and the modifications of the VLBI software package OCCAM. Furthermore, the work on the report of the IVS Working Group 2 on Product Specification and Observing Programs was coordinated in Vienna and a part of the 2nd IVS Analysis Pilot Project was organized here.

3. Staff

Personnel at IGG associated with the IVS Special Analysis Center in Vienna are Harald Schuh (Head of the Department of Advanced Geodesy, Member of the IVS Directing Board) and the research assistants Johannes Böhm (allocation 100%) and Thomas Hobiger (50%). Johannes Böhm is mainly concentrating on tropospheric and Thomas Hobiger on ionospheric researches.

4. Current Status and Activities

- Modification of the VLBI software package OCCAM
  Together with Oleg Titov (Australian Surveying and Land Information Group (AUSLIG)) and Volker Tesmer (Deutsches Geodaetisches Forschungsinstitut DGFI, Munich) a group was set up in summer 2000 to test, develop and further enhance the OCCAM software. At IGG, the classical least-squares approach of the Gauss-Markov model in OCCAM was extended, e.g. by allowing a free network solution [6].

- Modeling of tropospheric refraction
  Analogously to the widely used continued fraction forms, spherical harmonics were applied as mapping functions which project the zenith path delays onto delays at certain elevations. Analyses showed that this approach partly yielded better repeatabilities of station heights [1].
  In another project, IGS total zenith delays were introduced and fixed in the VLBI analyses of all NEOS-A sessions in 1999 and 2000 to avoid the high correlations between zenith delays and station heights. The repeatabilites of station heights improved significantly (up to 40%). Figure 2 shows the height repeatabilities of Fortaleza, with (red, or light and dotted) and without (blue, or dark and solid) using IGS zenith delays [2].

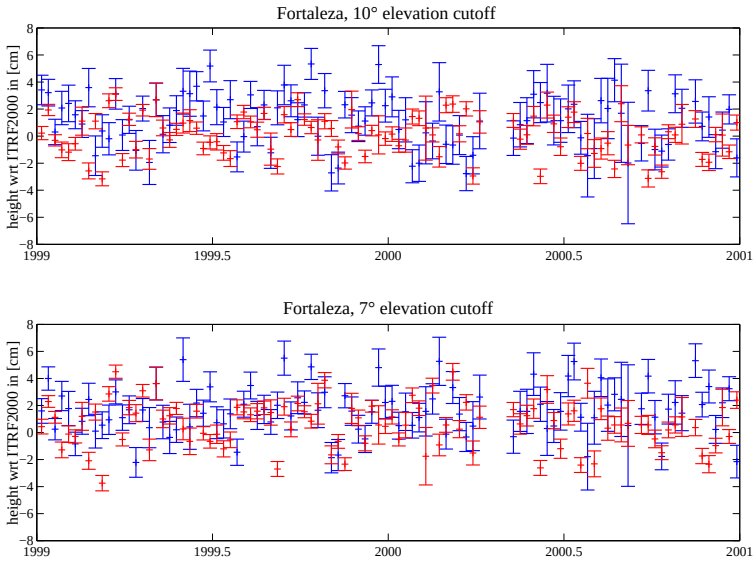

Figure 2. **Height Repeatability of Fortaleza**

IGG also volunteered to compare tropospheric parameters within the 2nd IVS Analysis Pilot Project. A combined solution of VLBI zenith delays will then be compared to the official IGS zenith delays.

- Determination of ionospheric parameters
  Based on ionospheric parameters provided by IGS, VLBI observation data were used to determine relative VTEC (Vertical Total Electron Content) values. Because of the large difference between the two frequencies of geodetic VLBI, ionospheric parameters from VLBI should be more accurate than those derived by GPS. Figure 3 shows a TEC map of Europe determined from VLBI observations.

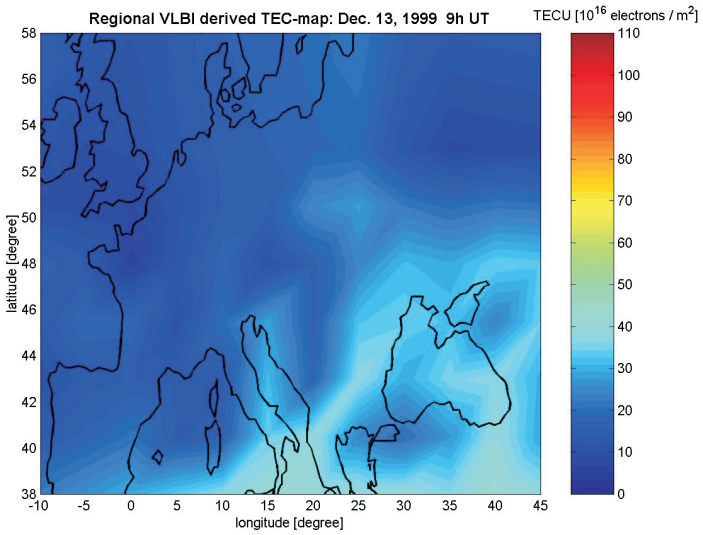

Figure 3. **Regional VLBI derived TEC map**

- IVS Working Group 2 on Product Specification and Observing Programs
  The work on the report of the IVS Working Group 2 was coordinated by its chairman Harald Schuh. The final report was published in [4] and can be downloaded from the IVS homepage.

5. Future Plans

During the year 2002 the plans of the IVS Special Analysis Center at IGG include:

- Further development of OCCAM, e.g. for the estimation of radio source coordinates.
- Research on new tropospheric models that are based on numerical weather data.
- Comparisons of tropospheric parameters within the 2nd IVS Analysis Pilot Project.

References

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