Vienna IGG Special Analysis Center Annual Report 2008

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Abstract

The main activities of the Institute of Geodesy and Geophysics (IGG) at the Vienna University of Technology in 2008 have been the contribution to the VLBI2010 simulations and the development of new VLBI software based on Matlab. Furthermore, studies about Earth rotation and reference frames have been continued.

1. General Information

The Institute of Geodesy and Geophysics (IGG) is part of the Faculty of Mathematics and Geoinformation of the Vienna University of Technology. It is divided into three research units, one of them focusing on advanced geodesy (mathematical and physical geodesy, space geodesy). Within this research unit, one group (out of four) is dealing with geodetic VLBI.

Figure 1. Some members of the VLBI group at IGG at the EGU General Assembly 2008 in Vienna. Standing: Robert Heinkelmann, Andrea Pany, Joerg Wresnik, Harald Schuh, Hana Spicakova; in the front: Sigrid Englich, Paulo Jorge Mendes Cerveira, Johannes Boehm.

2. Staff

Personnel at IGG associated with the IVS Special Analysis Center in Vienna are Harald Schuh (Head of IGG, Chair of the IVS Directing Board) and nine scientific staff members. Their main research fields are summarized in Table 1.

Table 1. Staff members ordered by the main focus of research.

Johannes Boehm	VLBI2010, Vienna VLBI Software (VieVS)
Andrea Pany	VLBI2010, troposphere, turbulence theory
Joerg Wresnik	VLBI2010, scheduling
Kamil Teke	VieVS (least squares adjustment)
Lucia Plank	VieVS (Earth orientation)
Hana Spicakova	VieVS (station displacements)
Sigrid Englich	Earth orientation, tidal influences
Paulo Jorge Mendes Cerveira	Earth orientation, datum definition
Robert Heinkelmann (until Nov. 2008)	Combination, celestial and terrestrial reference frame

3. Current Status and Activities

- **Vienna VLBI Software (VieVS)**
  In 2008 the IGG Vienna started to write new software for VLBI with Matlab. This VLBI software will not be written from scratch. Instead we will rely on the existing software package Occam which is used at the IGG Vienna. This work is also closely related to IVS Working Group 4 on VLBI Data Structures, which is chaired by John Gipson.

- **VLBI2010**
  A lot of effort was dedicated to the VLBI2010 Monte Carlo simulations. Using the Occam (Wresnik et al., 2008 [4]) and Precise-Point-Positioning (PPP) (Pany et al., 2008 [2]) simulators, the impact of antenna slew rates (Petrachenko et al., 2008 [3]) and the main stochastic error sources (troposphere, clock and measurement error) on VLBI analysis results were investigated. As an example, Figure 2 shows the influence of the station clock accuracy on the 3D position rms, simulated with the three software packages Solve, Occam, and PPP.

- **Earth rotation**
  Two ERP time series with hourly resolution were estimated from observational data from the years 1984-2007, using the conventional reference frames ITRF2005 and ICRF Ext.2 as well as an internal VLBI-only reference frame solution IGG07R04. A set of 77 ocean tidal constituents in the diurnal and semi-diurnal frequency bands was determined from both ERP solutions (ITRF2005 and IGG07R04) and compared to the IERS2003 conventional model (Englich et al., 2008 [1]) (Figure 3).
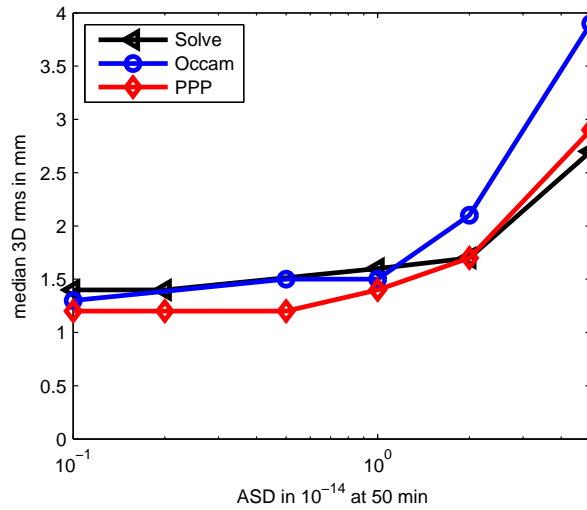
Figure 2. VLBI2010: Influence of the Allan Standard Deviation (ASD) of the station clocks on median 3D position rms in mm with the Occam and PPP simulations; the Solve simulations were done at GSFC.
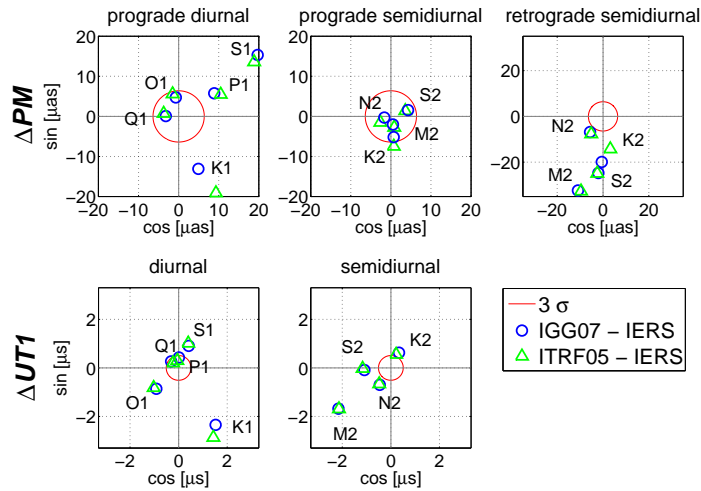

Figure 3. Earth rotation: Phasor plots of the major ocean tidal terms in polar motion (PM) and universal time (UT1) w.r.t. the IERS2003 conventional model.

4. Future Plans

In 2009 we will focus on the development of the new VLBI software VieVS. This software will also include a tool for scheduling purposes. Additionally, we will continue to contribute to the ongoing activities within VLBI2010 and to carry out Earth orientation and reference system studies.

5. Acknowledgements

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References

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