

The IVS Analysis Center at the Onsala Space Observatory

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Abstract

This report briefly summarizes the activities of the IVS Analysis Center at the Onsala Space Observatory during 2006. Some examples of achieved results and ongoing analyses are presented.

1. Introduction

The IVS Analysis Center at the Onsala Space Observatory focusses on a number of research topics that are relevant for space geodesy and geosciences. We address these research topics in connection to data observed with geodetic VLBI and complementing techniques. In the year 2006 the main focus was on high-frequency Earth orientation, GPS-VLBI ties, loading phenomena, and atmospheric water vapor. Some results are briefly presented in the following.

2. hfEOP from VLBI CONT Campaigns

We analyzed the CONT94, CONT02 and CONT05 VLBI data and derived polar motion and UT1 values with a temporal resolution of 1 hour. The resulting time series show periodic behavior with mainly diurnal and semi-diurnal periods. Most of this periodic behavior can be explained by a model for high-frequent polar motion and UT1 variations due to ocean tidal influences [1], [2]. However, the three CONT campaigns reveal significantly different residuals with respect to this model, in particular for polar motion. Figure 1 shows wavelet scalograms of retrograde and prograde residual polar motion after subtracting the theoretical model. Results have been presented at the IVS General Meeting 2006 [3] and work is continuing to understand the differences of the results from the three CONT campaigns.

3. GPS-VLBI Ties at Onsala and Ny-Ålesund

We analyzed all available GPS data recorded with GPS antennas mounted on top of the VLBI telescopes at Onsala and Ny-Ålesund. These antennas had been mounted in order to monitor the local ties between the radio telescopes and the GPS monuments at these two space geodetic sites [4], [5]. Time series of residuals with respect to mean value of the topocentric local ties at Onsala and Ny-Ålesund are shown in Fig. 2 and Fig. 3, respectively. The current level of accuracy of the performed measurements does not allow to monitor local-ties with sub-mm accuracy [6].

4. Ocean Tide and Atmospheric Loading

The service provided by the automatic ocean tide loading provider [7] has been maintained and in late 2006 a transition of the program to a new computer has started. We expect an improvement of the processing speed by a factor of ten compared to the old computer.

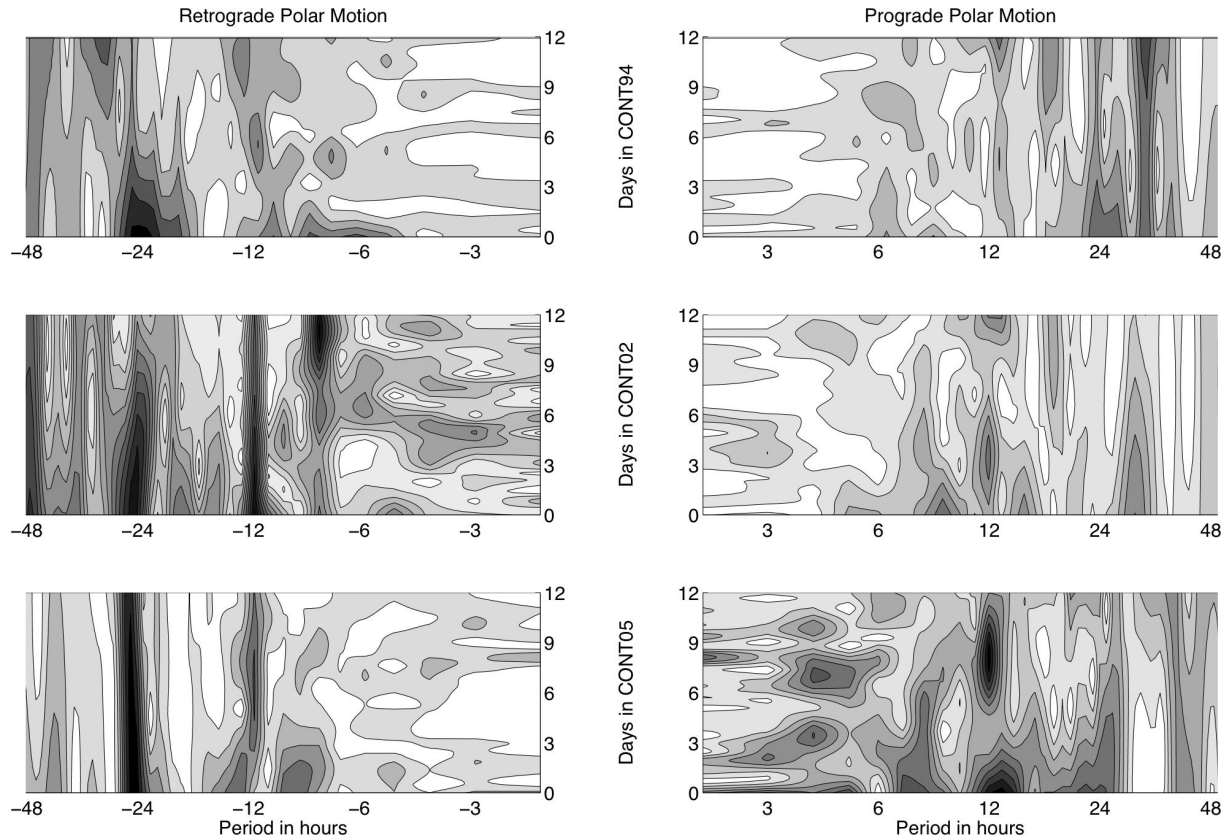


Figure 1. Wavelet scalograms of retrograde (left) and prograde (right) residual polar motion from CONT94 (top), CONT02 (middle) and CONT05 (bottom) after subtracting predictions based on the extended Ray model [1], [2]. Normalized wavelet energy is shown in grey-scale, where dark colours mean high energy.

5. Contribution to the IVS TROP Project

Also during 2006 we continued to submit on a regular basis tropospheric parameters for the VLBI stations observing in the IVS R1 and R4 networks [8].

6. Simulations of Equivalent Zenith Wet Delay for VLBI2010

We contributed to the VLBI2010 simulation efforts with simulations of equivalent zenith wet delays for all stations in the VLBI2010 simulation network. These simulations were done based on a turbulence model [9] together with wind data from a numerical weather model [10].

7. Outlook

The IVS Analysis Center at the Onsala Space Observatory will continue its work on specific topics relevant for space geodesy and geosciences.

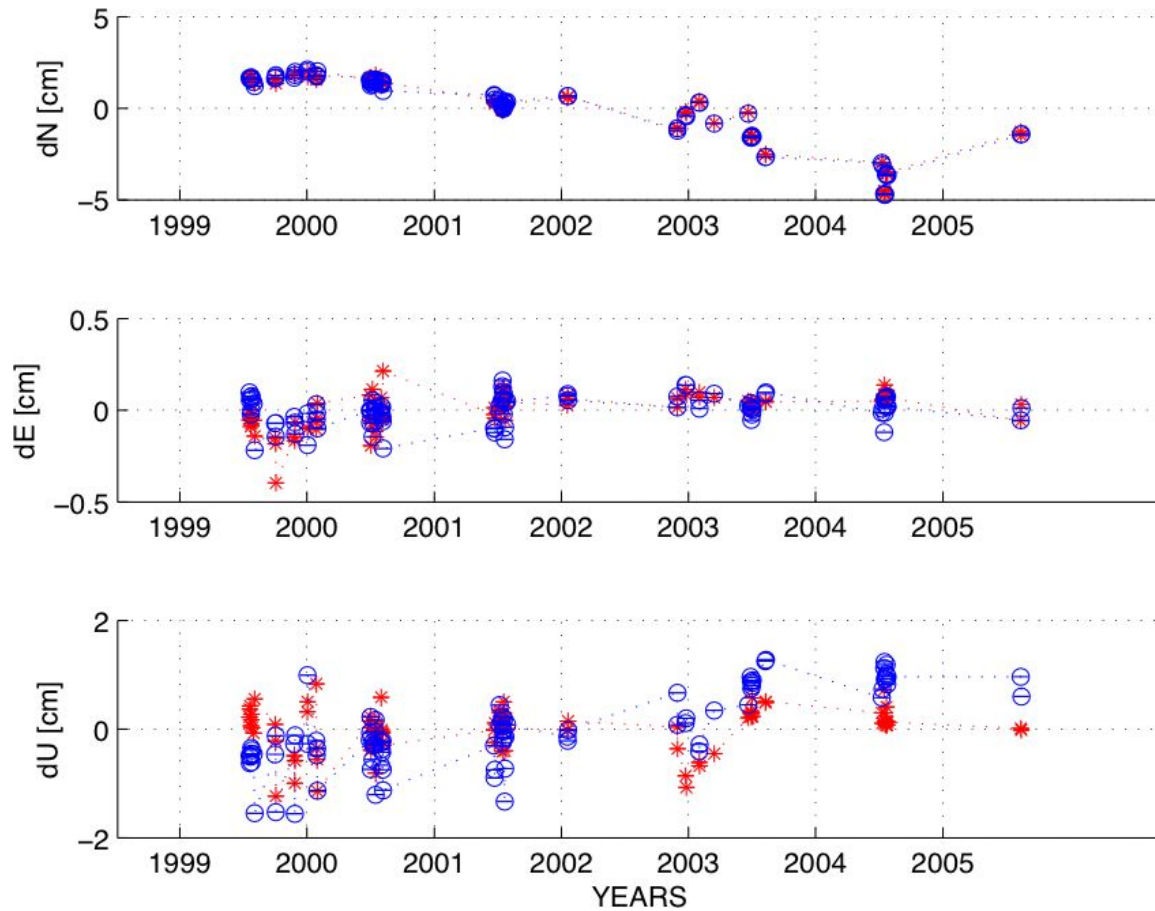


Figure 2. Time series of residuals with respect to a mean value of the topocentric local tie between the GPS monument and a GPS antenna mounted on top of the VLBI telescope at Onsala. Stars (red) correspond to L1-solutions, circles (blue) to L2-solutions in the GPS analyses.

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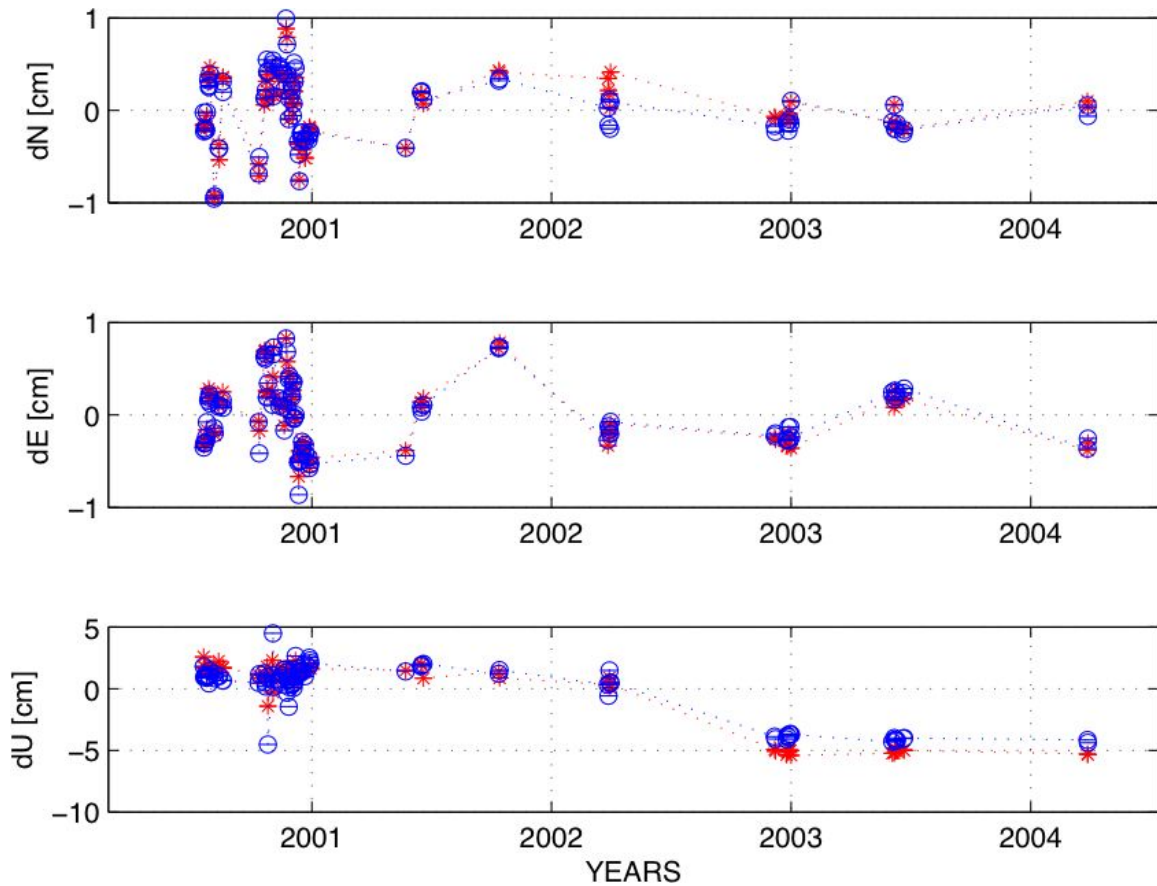


Figure 3. Time series of residuals with respect to a mean value of the topocentric local tie between the GPS monument and a GPS antenna mounted on top of the VLBI telescope at Ny-Ålesund. Stars (red) correspond to L1-solutions, circles (blue) to L2-solutions in the GPS analyses.

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