Italy INAF Analysis Center Report

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Abstract

This report summarizes the activity of the Italian INAF VLBI Analysis Center. Our Analysis Center is located in Bologna, Italy and belongs to the Institute of Radioastronomy which is part of the National Institute of Astrophysics. IRA runs the observatories of Medicina and Noto, where two 32m VLBI AZ-EL telescopes are situated. This report contains the AC VLBI data analysis activity and shortly outlines the investigations carried out in Medicina and Noto concerning gravitational deformations of the VLBI telescopes.

1. Current Status and Activity

Terrestrial surveying of VLBI telescope structures continued in 2007. A complete survey of the Medicina VLBI telescope was performed with the aim of determining a new estimate of the GPS-VLBI eccentricity and of determining the kinematic pattern of the S/X receivers located in the primary focus. The latter survey, with the same purpose, has been performed at Noto, too. These data are going to be combined with the laser scanning surveys performed in 2005, and they will also be compared to the results that are being obtained using a Finite Element Model of the antennas. The ultimate purpose is to determine the structural deformations caused by gravity during VLBI observations and to determine how and to what extent the reference points of the instruments are affected. Comparisons between the different approaches do show encouraging agreement and will probably supply interesting results concerning the possibility of determining an elevation dependent signal path variation model.

2. Data Analysis and Results

The IRA started to analyze VLBI geodetic databases in 1989, using a CALC/SOLVE package on the HP1000 at the Medicina station. In subsequent years, the same software was installed first on an HP360 workstation and later on an HP715/50 workstation. In more recent years, two HP785/B2600 workstations and an HP282 workstation were used. In 2007, a new Linux workstation was set up for the migration of all the VLBI data analysis, and Mark 5 Calc/Solve was installed. During 2007, we stored all the 1999—2007 databases available on the IVS data centers. All the databases were processed and saved with the best selection of parameters for the final arc solutions. Moreover, because of the new server, all the missing databases were downloaded from the IVS data centers in order to complete the IRA catalogue. In the meantime, databases already analyzed and archived on HP workstations were copied to the Linux workstation and analyzed in order to create new Mark 5 Solve superfiles for global solutions.

Our Analysis Center has participated in the IVS TROP Project on Tropospheric Parameters since the beginning of the activities. Tropospheric parameters (wet and total zenith delay, horizontal gradients) of all IVS-R1 and IVS-R4 24-hour VLBI sessions were regularly submitted in form of SINEX files. During the past year, due to several problems, we did not regularly submit results, but we continued our analysis in order to submit new Mark 5 solutions. We have computed long time series of troposphere parameters using all VLBI sessions available on our catalogue in order to estimate the variations over time of the content of water vapor in the atmosphere.

3. Outlook

For the time being, our catalogue finally contains all available experiments. In 2008, using our new Linux workstation and the up-to-date Mark 5 Calc/Solve software, we plan to analyze all available databases, thus completing the catalogue. The regular submission of INAF tropospheric parameters to the IVS data centers will resume as soon as possible.