Italy CNR Analysis Center Report

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Abstract

This report summarizes the work of the Italy CNR VLBI Analysis Center. It will give fundamental information about the structure of the center, its locations, and its activities.

1. Introduction

The Italy CNR VLBI Analysis Center has been the joint effort of two institutes of Consiglio Nazionale delle Ricerche (CNR) to improve the quality of geodetic VLBI results, in particular in the European area. The two institutes are:

a) the Istituto di Radioastronomia (Institute of Radio Astronomy, IRA) located in Bologna, where the main research activity is carried out, both in radioastronomy and geodesy;

b) the Istituto di Tecnologia Informatica Spaziale (Institute of Information and Technology for Space, ITIS), located in Matera at the Center of Spatial Geodesy (of the Italian Space Agency), where a VLBI antenna, a laser ranging telescope, a permanent GPS receiver and a PRARE antenna are located.

However the two institutes mentioned above are now a single institute, the "Istituto di Radioastronomia", with a section located in Matera. The new CNR institute is carrying on the same commitment to IVS as the previous two institutes.

The IRA started to analyze VLBI geodetic databases in 1989, using a CALC/SOLVE package on the HP1000 at the Medicina station. In the following years that software was installed on an HP360 workstation and later on on an HP715/50 workstation. We have analyzed here mostly databases with some European baselines, generally at least three. Most of the databases have been reprocessed here in Bologna (using CALC and SOLVE). We are now using CALC9.1 and F-solve for data analysis.

We have specialized the Bologna section to analyze single databases, in order to produce the final "single arc" solution. The global solutions have been computed in Matera at the new section of the institute.

2. Data Analysis and Results

In Bologna the main computer is a HP715/80; the computer name is boira6.ira.cnr.it. On it we are now analysing single experiments (using interactive solve); the global solutions are run mostly on Matera computer. A new HP 785/B2600 workstation is already installed but the installation on it of the CALC/SOLVE package is still under way. Its internet address is boira3.ira.cnr.it.

In Matera the main computer is an HP282 computer with internet name hp-j.itis.mt.cnr.it. Also here we have installed F-solve (with a center name of ITISCNR) and we are using it mostly for global solutions in order to compute the positions and velocities of European stations.

In May 2002 we received the Call for Participation in the IVS Pilot Project - Tropospheric Parameters, dedicated to test and evaluate future provision of additional operational products by IVS. Regular submissions of tropospheric parameters of all IVS-R1 and IVS-R4 24hr VLBI sessions were solicited.

Our Analysis Center joined the project and submits estimates of tropospheric parameters (wet and total zenith delays, horizontal gradients) for all IVS-R1 and IVS-R4 sessions since January 1st, 2002, on a regular basis. In order to fulfil the request of the project, we modified the CALC/SOLVE software, so that it is able to produce the sinex files containing the tropospheric parameters in the suitable format.

Moreover, we imported and analysed all the other 2001 and 2002 databases available on the IVS data centers, in order to compute the tropospheric parameters. We are carrying out a comparison between the VLBI tropospheric estimates and the GPS-derived troposphere for the co-located sites.

We performed a suitable analysis using the same dataset in order to compute the EOP parameters. We will submit our solution to IVS soon.

We are continuing to work using tropospheric zenith path delays from GPS in order to improve the repeatability of the VLBI geodetic results. We have inserted the wet zenith path delays in the VLBI databases as if this information had been derived using a water vapor radiometer. The tropospheric data have been collected at the Berna site of the IGS. However the IGS data, with an hourly interval, are the total tropospheric delays. From that we have subtracted the dry delays, from the VLBI data, in order to produce the "wet only" zenith path delays. These data have been inserted into the VLBI databases using an updated version of DBCAL.

The use of GPS tropospheric zenith path delays has produced some interesting results. In the European databases of 1998, the use of the new way of analyzing VLBI data seems to produce a better repeatability for the European baseline lengths. We are still working on the 1999 databases and are also modifying the introduction of the wet zenith path delays from GPS solutions.