

Observatorio Astronómico Nacional – Yebes

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Abstract

This report updates the description and details of the OAN facilities as a network station in IVS. The 14 meter radiotelescope at Yebes participates regularly in the geodetic VLBI campaigns (EUROPE and CORE), as well as astronomical VLBI experiments as part of the European VLBI Network (EVN). The institute staff is also involved in technical development and geodetic research.

1. General Information: The OAN Facilities

The Observatorio Astronómico Nacional (OAN) of Spain operates a 14 meter radiotelescope at Yebes (Guadalajara, Spain). This facility is a network station in IVS, and participates regularly in the geodetic VLBI campaigns to study the tectonic plate motions in Europe (project EUROPE), Earth rotation, and pole motion (project CORE).

The characteristics of the 14-m radiotelescope and a photograph are available in the 1999 IVS Annual Report, and a map of the Yebes site is in the report for year 2000.

The institute is currently involved in the construction of a new 40 meter radiotelescope (Fig. 1) which is expected to be available for geodetic VLBI observations in 2004.

2. Description of the OAN Station at Yebes

The main instrument at OAN is nowadays the 14 meter radio telescope used for VLBI. The most important changes in the equipment since the last IVS Annual Report in 2000 have been the installation of the MKIV decoder and a second headstack at the VLBA recorder. Other relevant changes are listed in Table 1.

Table 1. Characteristics of the VLBI equipment.

VLBI terminal type	VLBA4 (Mark IV formatter and decoder, VLBA-G rack and VLBA-4 recorder)
recording media	thick and thin tape, 1" wide
Telescope control computer	HP1000 + HP2100
VLBI system computer	Pentium II/350
Operating system	Debian 2.1r3 (kernel 2.0.34)
Field System version	FS 9.5.2
H-maser frequency standard	KVARTZ CH1-75
GPS receiver	6 channel TrueTime XL-DC-602
Meteorological station	SEAC-300

The OAN laboratories at Yebes have continued working on the development of cryogenic HEMT amplifiers to be used in receivers at Centro Astronómico de Yebes (CAY), other Radio Astronomy observatories, and the ESA satellite for far infrared and submillimeter telescope (FIRST/HERSCHEL).

We will also mention that the reference station of the permanent GPS network in Spain (coded “YEBE”) is operated at Yebes by the Instituto Geográfico Nacional (IGN) of Spain, host institute for OAN. The data are analysed and sent weekly to the coordinating center of EUREF in Frankfurt. More information can be found at the URL <http://www.geo.ign.es/>.

3. OAN Staff Working in VLBI

Table 2 lists the OAN staff which are involved in the VLBI studies, some of which can be found at the telescope (CAY) address. The associated members of IVS are indicated with an asterisk. Contact information is provided at the URL <http://www.oan.es/vlbi/>. The VLBI activities are also supported by other staff like receiver engineers, computer managers, secretaries and students.

Table 2. Staff in the OAN VLBI group (Email: vlbi@oan.es).

Name	Background	Role	Dedication	Address
Jesús Gómez-González*	Astronomer	Director	10%	OAN
Alberto Barcia	Engineer	Chief engineer	10%	CAY
Francisco Colomer*	Astronomer	CAY site manager and VLBI coordinator	40%	OAN
Pablo de Vicente*	Astronomer	Technical responsibility	30%	CAY
Isaac López-Fernández	Engineer	Technical support	20%	CAY
Maria Rioja*	Astronomer	Geodesy researcher	50%	OAN
Jean-François Desmurs	Astronomer	Support	10%	OAN

4. Status of the Geodetic VLBI Activities at OAN

The main contribution of OAN to IVS is the realization of geodetic VLBI observations in the EUROPE and CORE projects: the OAN radio telescope at Yebes has participated in three EUROPE and four CORE experiments in 2001. The institute also participates in the European VLBI Network (EVN) for astronomy, taking part in its logistics and carrying out technical development.

On the other hand, a project to investigate new strategies to calibrate the contribution of the propagation medium in the analysis of VLBI observations is being developed by:

- Using new modes of observations, in particular with VLBI observations in “cluster-cluster” mode. This is a project in collaboration with other colleagues in JIVE (Dwingeloo, The Netherlands) and MPIfR (Bonn, Germany). That mode of observation involves sites with multiple elements which allow simultaneous observations of multiple sources. In principle this configuration offers advantages to model the temporal and spatial structure of the propagation medium. We carried on observations at 18 cm to investigate the application to a 2-D gradient modeling of the ionospheric contribution to the observables.
- Using new strategies in the analysis, namely implementing GPS tropospheric estimates into the analysis of VLBI observations with SOLVE. This is a project in collaboration with the Italian geodetic group led by Paolo Tomasi (IRA, Bologna, Italy). The comparison of the results from our repeatability tests, using the estimates from the standard route of analysis of

VLBI observations with the geodetic program CALC/SOLVE, and from a novel hybrid route which implements GPS tropospheric estimates into the VLBI analysis, are very encouraging and support further investigations of the potential of this hybrid route. We have finalized the analysis of the EUROPE campaign of VLBI observations in 1998.

5. Future Plans

The OAN radio telescope at Yebes continues participating regularly in the campaigns for the EUROPE and CORE projects.

We foresee the upgrade of the telescope control system by replacing the current HP2100 computer by a VME programmable computer. This is being developed within the framework of the EU “Infrastructure Cooperation Network” (RADIONET) proposal.

Finally, the construction of a new 40 meter radiotelescope at Yebes is progressing well. The concrete pedestal is finished, and the backstructure and panels are being manufactured. This telescope is expected to be operational at S/X bands in 2004.

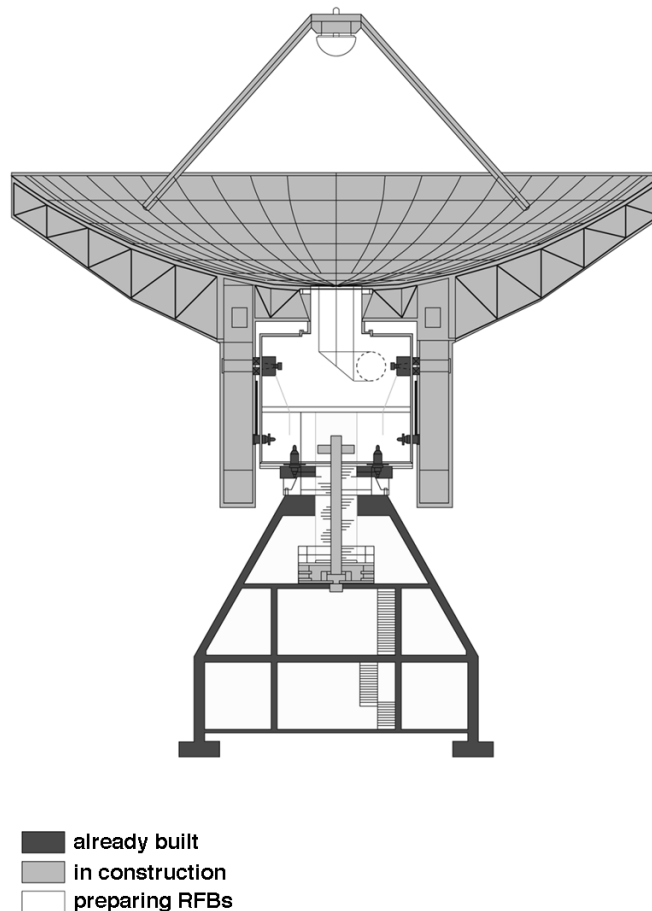


Figure 1. Status of construction of the new 40 meter radiotelescope of OAN at Yebes (Guadalajara, Spain).

References

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