

The Bordeaux Observatory IVS Analysis Center

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Abstract

This report gives an overview about VLBI activities in Bordeaux during the past year. It also presents the expected contribution of Bordeaux Observatory to IVS and lists the staff involved in the IVS Analysis Center work. Future plans include the development of a new astrometric observing program on the European VLBI Network (EVN) for densifying the International Celestial Reference Frame (ICRF).

1. VLBI in Bordeaux

Bordeaux Observatory (Fig. 1) is located in the southwest of France (about 600 km from Paris) near the mouth of the Garonne river. It is funded by the University of Bordeaux and the CNRS (National Center for Scientific Research).

The Observatory comprises four scientific groups specialized in radioastronomy, astrometry, planetology, and solar research. The radioastronomy group has long been involved in VLBI observations of active galactic nuclei and maser sources for astrophysical objectives. VLBI astrometry and geodesy is a new activity set up during the past year as a cooperation between the astrometry and radioastronomy groups.

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Figure 1. Aerial view and address of Bordeaux Observatory.

2. Expected Contribution to IVS

Our major scientific interest is the celestial reference frame, especially the maintenance and extension of the International Celestial Reference Frame (ICRF). We expect to contribute to this area in the form of:

- Observational data:

Our goal is to develop an observing program dedicated to astrometry on the European VLBI Network (EVN) in cooperation with the IAU sub-group in charge of the maintenance and extension of the ICRF. The subsequent data will be submitted to IVS as data products.

- Celestial frame analyses:

Our initial plan is to analyze only the data from the expected EVN experiments. Depending on the available support later on, we may develop larger solutions, including additional data from other observing programs, and provide time series of source positions. The aim is to study the ICRF source position stability and the physical phenomena that can affect this stability (e.g. source structure variations).

VLBI analyses will be conducted with the MODEST software, developed and maintained by the Jet Propulsion Laboratory [1].

3. Scientific Staff

VLBI in Bordeaux benefits from experience of researchers with background in both astrometry and radioastronomy. Table 1 lists the staff participating in the IVS Analysis Center work.

Table 1. Staff involved in the IVS Analysis Center work.

Name	Background	Position
Patrick Charlot	astrometry, radioastronomy	permanent
Bruno Viateau	astrometry	post-doc
Alain Baudry	radioastronomy	permanent

4. Overview of Recent Activities

During the past year, astrometric VLBI activities in Bordeaux have focused on the following technical and scientific matters:

- Installation and test of the MODEST software on various computer platforms (HP, Sun, DEC/Unix, DEC/VMS):

These tests have been carried out during a visit of O. J. Sovers (Jet Propulsion Laboratory) at Bordeaux Observatory in the fall of 1998. They revealed a few non-portable features in the MODEST code. These are being corrected, so the MODEST code should be fully portable in the near future.

- ICRF source classification based on observed structure:

The work previously carried out in collaboration with A. L. Fey (U.S. Naval Observatory) [2] has been pursued further for 225 additional sources. As with the previous work, the sources have been separated into four classes according to the magnitude of the expected source structure effects on astrometric bandwidth synthesis delay observations. This classification now covers 392 ICRF sources, and is complete for about 90% of the ICRF sources north of -20° declination [3].

- Study of the optimal use of the EVN for astrometric observations:

Discussions have been initiated about the possible use of the EVN (and JIVE correlator) to supplement the existing astrometric programs ongoing with the VLBA and the DSN for maintaining and extending the ICRF. These concluded that the EVN would be useful for densifying the ICRF, especially towards weaker sources. A subsequent proposal for observing 150 new sources, each source re-observed three times, has been submitted to the EVN.

5. Outlook

Starting next fall, we will have improved computer facilities with a new faster Unix workstation (Compaq DS20/EV6). The MODEST software will be installed on this new workstation along with the NASA SKED program, while the Goddard data base system will stay on our old HP workstation.

If approved by the EVN Program Committee, we expect the initial experiment of the proposed EVN observing program to be carried out within a year. This experiment will be designed to provide first-epoch observations of 50 new sources. Time will be devoted to refine the source selection strategy before scheduling.

References

- [1] Sovers, O. J., Jacobs, C. S.: 1996, Observation Model and Parameter Partials for the JPL VLBI Parameter Estimation Software "MODEST"—1996, JPL Publication 83-39, Rev. 6, August 1996.
- [2] Fey, A. L., Charlot, P.: 1997, VLBA Observations of Radio Reference Frame Sources. II. Astrometric Suitability Based on Observed Structure, *ApJS*, 111, 95–142.
- [3] Charlot, P., Fey, A. L.: 1999, A Classification of ICRF Sources Based on Observed Structure for Ultra-precise VLBI Astrometry and Geodesy, Proceedings of the 13th Working Meeting on European VLBI for Geodesy and Astrometry, Viechtach, February 12-13, 1999, edited by W. Schlüter and H. Hase, Bundesamt für Kartographie und Geodäsie, Wettzell, p. 217–223.