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“VLBI2010 Core Station Standard”

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VLBI2010 Core Station Standard

1. Introduction

This document provides guidelines for VLBI observing stations to be included in the IVS2010 observing network based on the VLBI2010 technology: It should be considered along with other related documents: VLBI2010 system requirements and GGOS station requirements (when available).

2. Station location

The following criteria should all be considered in selection of station location:

- Geological stability, i.e. location on a stable regional crustal block, on firm, stable material preferably basement outcrop, and with small ground water fluctuations.
- Absence of existing and forecastable obstructions above 5 deg for at least 95% of the horizon.
- Minimum radiofrequency interference from existing and forecastable local transmitters.
- Collocation with other space geodesy techniques, especially with long observational history.
- Existing or planned data link with data transmitting speed of at least 8 Gbps.
- Existing or planned connection to regional/national geodetic networks.
- Coordination with IVS and IAG/GGOS directing bodies.

3. Station equipment

A VLBI2010 station must be equipped with the following units and systems:

- VLBI antenna with all the equipment needed for the observations, designed and equipped in accordance with the VLBI2010 system specifications given in separate documents. The second antenna should be placed in the station as soon as possible.
- GPS receiver corresponding to the IGS requirements and connected to the station clocks. If the receiver is not yet IGS station, this should be made as soon as possible.
- Meteo station.
- Uninterruptible power supply for full station operations.
- Rooms and equipment needed for station maintenance and operational repair.
- Local geodetic network.

4. Meteo station

The meteo station must provide automated digital measurements of the following parameters with the respective accuracy:

- Temperature 0.5 °C;
- Pressure 0.5 hPa;
- Relative humidity 5%.

Better measurement accuracy is appreciated. Regular calibration of the meteorological instrumentation must be performed to provide the absolute errors given above.

The 3D local tie between meteo sensors and VLBI and GPS reference points must be measured with error less than 0.5 m. Station personal should avoid meteo sensor movement without urgent need.

The results of the surveys in RINEX format must be stored in the IVS and IGS public archives.

5. Local geodetic network

The local geodetic network should consist of station network and footprint network. The former is mandatory. The station network must meet the following criteria:

- There must be at least three ground monuments around each VLBI antenna at the distance of 30-60 m (up to 100 m for large antennas).
- Mutual visibility between these monuments and the VLBI and GPS reference points must be provided.
- The monuments design must correspond to the local geological conditions and must provide the maximum stability over time.

The footprint network should consist of at least three monuments located around the site, as a rule, at the distance of 10-30 km from the station, depending on the local geological situation.

The station geodetic network should be surveyed along with VLBI and GPS reference points as often as once a 2.5 year, in summer and winter seasons alternately. More frequent surveys, once a 0.5 year, should be performed during the first two years after installation of a new instrument or monuments.

Measurement of the VLBI antenna(s) axis offset must be included in the survey.

The footprint network should be surveyed frequently enough to watch over the local and regional site and geological movements.

The accuracy of the surveys should not be worse than 1 mm. Temperature dependence of the eccentricity vectors should be investigated, and survey data should be reduced to the reference temperature when needed.

All survey data should be rigorously reduced to provide 3D geocentric coordinate difference in the ITRF system.

The results of the surveys in SINEX format must be stored in the IVS public archive, along with detailed reports. The results of local tie measurements between VLBI and GPS reference points should be also delivered to IERS.

6. Acknowledgements

During preparation of this document the following documents were used:

1. H. Drewes (1998), The International Space Geodetic and Gravimetric Network (ISGN). IAG CSTG Bulletin No. 15 Progress Report 1998, Eds. G. Beutler, H. Drewes, H. Hornik, Munich 1999, pp. 13-15.
2. IGS Site Guidelines. <http://igscb.jpl.nasa.gov/network/guidelines/guidelines.html>.