

# Fortaleza Station Report for 2011

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## Abstract

This is a brief report about the activities carried out at the Fortaleza geodetic VLBI station (ROEN: Rádio Observatório Espacial do Nordeste), located in Eusébio, CE, Brazil, during the period from January until December 2011. The observing activities were resumed in May after the major maintenance that comprised the azimuth bearing replacement. The total observational experiments consisted of 73 VLBI sessions and continuous GPS monitoring recordings. Fortaleza station participated in the CONT11 campaign. Around 90% of the VLBI data has been transferred to the correlators through a high speed network.

## 1. General Information

The Rádio Observatório Espacial do Nordeste, ROEN, located at INPE facilities in Eusébio, nearly 30 km east of Fortaleza, Ceará State, Brazil, began operations in 1993. Geodetic VLBI and GPS observations are carried out regularly, as contributions to international programs and networks. ROEN is part of the Brazilian space geodesy program, which was initially conducted by CRAAE (a consortium of the Brazilian institutions Mackenzie, INPE, USP, and UNICAMP) in the early 1990s. The program began with antenna and instrumental facility installations, with activities sponsored by the U.S. agency NOAA and the Brazilian Ministry of Science and Technology's FINEP agency. ROEN is currently coordinated by CRAAM, Center of Radio Astronomy and Astrophysics, Engineering School, Mackenzie Presbyterian University, São Paulo, in agreement with the Brazilian National Space Research Institute, INPE. The activities were later carried out under an Agreement of Cooperation signed between NASA—representing research interests of NOAA and USNO—and the Brazilian Space Agency, AEB. This Agreement has been extended until 2021. Under the auspices of this NASA-AEB Agreement, contracts have been signed between NASA and CRAAM, Mackenzie Presbyterian Institute and University to partially support the activities at ROEN. The present contract holds until 2014. The counterpart of the operational costs, staff, and support of infrastructure are provided by INPE and by Mackenzie.

## 2. Main Instruments

The largest instrument at ROEN is the 14.2-m radio telescope, on an alt-azimuth positioner. It is operated at S- and X-bands, using cryogenic radiometers. The system is controlled by the Field System, Version 9.10.4. Observations are recorded with a Mark 5 system. One Sigma-Tau hydrogen maser clock standard is operated at ROEN. GPS monitoring is performed within a cooperative program with NOAA (USA). There is a Leica System 1200 installed at the station that operates continuously. The collected data are provided to the NOAA/IGS center and to the Brazilian IBGE center. ROEN has all basic infrastructures for mechanical, electrical, and electronic maintenance of the facilities.



Figure 1. Receiver box being removed for maintenance.

### 3. Staff

The Brazilian space geodesy program is coordinated by one of the authors (PK), who is Brazil's AEB representative in the NASA-AEB Agreement. The coordination receives support from the São Paulo office at CRAAM/Instituto and Universidade Presbiteriana Mackenzie, with administrative support given by Valdomiro S. Pereira and Lucíola Russo. The Fortaleza Station facilities and geodetic VLBI and GPS operations are managed on site by Dr. A. M. P. de Lucena (CRAAE/INPE), assisted by Eng. Adeildo Sombra da Silva (CRAAE/Mackenzie), and the technicians Avicena Filho (CRAAE/INPE) and Karlos Daniel Menezes (CRAAE/Mackenzie).

## 4. Current Status and Activities

### 4.1. VLBI Observations

In the year 2011, Fortaleza carried out geodetic VLBI experiments as listed in Table 1.

Table 1. 2011 session participation.

Experiment	Number of Sessions
IVS-R1	15
IVS-R4	27
IVS-T2	02
IVS-R&D	02
IVS-RDV	04
IVS-CRF	02
IVS-CONT11	15
IVS-CRMS	01
IVS-OHIG	03

## 4.2. Operational and Maintenance Activities

The summary of activities performed in the period is listed below:

- 1) Supervision of azimuth bearing replacement and antenna painting service;
- 2) Installation of the new cryogenic system;
- 3) Re-installation of the receiver box;
- 4) Repair and maintenance of the following equipment: shaft encoder, FS computer, temperature controller and IF distributor, Mark IV formatter;
- 5) Maintenance and adjustment of DC azimuth and elevation motors;
- 6) Re-making of the antenna pointing model;
- 7) Tests of the antenna, receiver electronics, data acquisition and recording systems for the CONT11 campaign;
- 8) Installation and tests of the Mark IV decoder;
- 9) Operation and maintenance of geodetic GPS (NOAA within the scope of NASA contract);
- 10) Operation and maintenance of power supply equipment at the observatory (main and diesel driven standby);
- 11) Maintenance of the Web site (<http://www.roen.inpe.br>) and the local server computer.

## 4.3. GPS Operations

The IGS network GPS receiver operated regularly at all times during 2011. Data were collected and uploaded to an IGS/NOAA computer.

## 5. Future Plans

Plans for the immediate future consist of the continuation of geodetic VLBI regular observations and the support of GPS receiver operations. Further progress is expected to expand data transmission via high speed national and international networks.

## Acknowledgements

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