

Fortaleza Station 2013 Annual Report

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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 2013. The total observed experiments consisted of 99 VLBI sessions and continuous GPS monitoring recordings.

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 1990's. The program began with antenna and instrumental facilities erected, 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 are cur-

rently carried out under an Agreement of Cooperation signed between NASA—representing research interests of NOAA and USNO—and the Brazilian Space Agency, AEB, which has been extended until 2021. Under the auspices of the NASA-AEB Agreement, a contract was signed between NASA and CRAAM, Mackenzie Presbyterian Institute and University to partially support the activities at ROEN.

The counterpart of the operational costs, staff, and support of infrastructure are provided by INPE and by Mackenzie.



Fig. 1 14.2-m radio telescope.

1. Universidade Presbiteriana Mackenzie, CRAAM and INPE, Rádio Observatório Espacial do Nordeste, ROEN
2. Instituto Nacional de Pesquisas Espaciais, ROEN

Fortaleza Network station

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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.

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 from Valdomiro M. S. Pereira and Lucíola Melissa Russi. The Fortaleza Station facilities and geodetic VLBI and GPS operations are managed on site by Dr. Antonio Macilio Pereira de Lucena (INPE), assisted by Eng. Adeildo Sombra da Silva (Mackenzie), and the technicians Avicena Filho (INPE) and Francisco Renato Holanda de Abreu (Mackenzie).

4 Current Status and Activities

4.1 VLBI Observations

In the year 2013, Fortaleza station participated in geodetic VLBI experiments as listed in Table 1.

Most of the recorded data are being transferred to the correlators through a high speed network from the Mark 5A recorder unit. The data from the Fortaleza station is uploaded either to the correlators in the U.S. through FIU (Florida International University) or directly to the Bonn correlator.

Table 1 2013 session participation.

Experiment	Number of Sessions
IVS-R1	40
IVS-R4	45
IVS-T2	06
IVS-R&D	01
IVS-RDV	01
IVS-CRF	02
IVS-CRMS	02
IVS-OHIG	04

4.2 Operational and Maintenance Activities

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

- 1) Repair and maintenance of the cryogenic system, Mark IV video converters, and antenna pointing system;
- 2) Survey on RFI in S-band;
- 3) Maintenance and adjustment of DC azimuth and elevation motors;
- 4) Operation and maintenance of geodetic GPS (NOAA within the scope of the NASA contract);
- 5) Operation and maintenance of power supply equipment at the observatory (main and diesel driven standby);
- 6) Welding at some points of the antenna structure;
- 7) Maintenance of the Web site and the local server computer (<http://www.roen.inpe.br>).

4.3 GPS Operations

The IGS network GPS receiver operated regularly at all times during 2013. Data were collected and uploaded to an IGS/NOAA computer.