

Fortaleza Station Report for 2008

*Pierre Kaufmann, A. Macílio Pereira de Lucena, Adeildo Sombra da Silva,
Claudio E. Tateyama, Avicena Filho, Carlos Fabiano B. Moreira*

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, in 2008. The observing activities consisted of 79 VLBI sessions and continuous GPS monitoring recordings. The installation of optical fiber was completed, and the station switched to a 1 Gbit/s high speed network, to be used in e-VLBI operations. Regular GPS observations were carried out at the same site.

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 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 currently carried out under an Agreement of Cooperation signed between NASA—representing research interests of NOAA and USNO—and the Brazilian Space Agency, AEB, lasting until 2011. 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 infrastructure support are provided by INPE and by Mackenzie.



Figure 1. Fortaleza's 14.2 m antenna.

2. Component Description

The largest instrument of ROEN is the 14.2 m radio telescope, an alt-azimuth positioner. It is operated at S- and X-bands, using cryogenic radiometers. The system is controlled by the Field System, Version 9.9.2. 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 2. Fortaleza station control rack.

3. Staff

The Brazilian space geodesy program is coordinated by Prof. Pierre Kaufmann, who is Brazil AEB representative in the NASA-AEB Agreement. The coordination receives support from the São Paulo office at CRAAM/Instituto and Universidade Presbiteriana Mackenzie, with scientific assistance from Dr. Claudio E. Tateyama and partial administrative support from Valdomiro S. Pereira and Neide Gea Escolano. Partial technical assistance is occasionally given by technical staff from the Itapetinga Radio Observatory near São Paulo, also operated by INPE/Mackenzie. 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 technicians Avicena Filho (CRAAE/INPE) and Carlos Fabiano B. Moreira (CRAAE/Mackenzie).

4. Current Status and Activities

4.1. VLBI Observations

Fortaleza participated in geodetic VLBI experiments as detailed in table 1 for the year 2008.

Table 1. 2008 session participation.

| Experiment | Number of Sessions |
|------------|--------------------|
| IVS-R1 | 26 |
| IVS-R4 | 35 |
| IVS-T2 | 04 |
| IVS-CRF | 03 |
| IVS-OHIG | 04 |
| IVS-CRMS | 03 |

4.2. Development and Maintenance Activities in 2008

Considerable attention was given to technical maintenance, especially to the following activities: 1) Maintenance of the cryogenic system, 2) Replacement of Mark IV power supplies, 3) Repairs of Mark IV video converters and the Mark IV IF3 Distributor module, 4) Repair of the UPS system, 5) Maintenance of the Web site (<http://www.roen.inpe.br>) and the local server computer, 6) Repair and adjustment of the receiver telemetry system, 7) Update of the Mark 5 operational system and software, and 8) Repair and alignment of elevation motor drives.

4.3. GPS Operations

The IGS network GPS receiver operated regularly at all times during 2008. Data were collected and uploaded to an IGS/NOAA computer.



Figure 3. Leica GPS receiver.

4.4. High Speed Network

During 2008, performance tests were implemented between the Fortaleza/Eusébio (ROEN) station, RNP (Rede Nacional de Pesquisas - Brazil National Research Network) and Haystack Observatory, with 200 Mbps and 90 Mbps data rates being obtained, respectively. Some intercon-

nection problems were detected and are being solved to improve that performance to at least 1 Gbps.



Figure 4. High speed network switch.

5. Future Plans

The optimized high speed optical network connection will allow ROEN to participate in e-VLBI experiments. The tests for the improvement of the network data rates are currently being carried out.

6. Acknowledgements

These activities have received partial support from NASA, within an agreement with the Brazilian Space Agency (AEB) and a contract with Mackenzie, as part of an agreement between Mackenzie INPE.