

## Fortaleza Station Report for 2003

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### Abstract

This is a brief report on the activities carried on at Fortaleza geodetic VLBI Station (ROEN: Rádio Observatório Espacial do Nordeste), Eusébio, CE, Brazil, in 2003, consisting mainly of 66 VLBI observing sessions and continuous GPS monitoring recordings.

### 1. Introduction

The Rádio Observatório Espacial do Nordeste, ROEN, located at INPE facilities in Eusébio, nearly 30 km east from 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 carried out by CRAAE, the Center for Radio Astronomy and Space Applications (a consortium between Brazilian institutions Mackenzie, INPE, USP and UNICAMP). During the year of 2003 the operational staff and part of infrastructure were maintained within an agreement between the Instituto Nacional de Pesquisas Espaciais, INPE and Instituto Presbiteriano Mackenzie through its Universidade Presbiteriana Mackenzie, Centro de Rádio-Astronomia e Astrofísica Mackenzie, CRAAM. Part of operation costs and technical maintenance, support of infrastructure, are sponsored by US agencies NASA, USNO and NOAA, with Agreements with Mackenzies CRAAM, under the Brazilian Program for Space Geodesy.



Figure 1. Fortaleza staff in front of antenna

### 2. Brief Description of ROEN Facilities

The largest instrument of ROEN is the 14.2 m radio telescope, on one alt-azimuth positioner. It is operated at S- and X-bands, using cryogenic radiometers. The system is controlled by Field

System, Version 9.6.2 program. Observations are recorded with a Mark III data acquisition system. One Sigma-Tau hydrogen maser clock standard is operated at ROEN.

GPS monitoring is performed by one dual frequency GPS Rogue receiver operated continuously. The collected data are provided to the IGS center, as well to Brazilian IBGE center. ROEN has all basic infrastructure for mechanical, electrical and electronic maintenance of the facilities.

### 3. Space Geodesy Team

The Brazilian space geodesy program is coordinated by Prof. Pierre Kaufmann, from São Paulo main office at CRAAM(CRAAE)/Instituto and Universidade Presbiteriana Mackenzie, receiving scientific assistance from Dr. Claudio E. Tateyama, and partial administrative support from Valdomiro S. Pereira and Neide Gea. Partial technical assistance is given by Itapetinga Radio Observatory staff, near São Paulo, also operated by INPE/Mackenzie.

The Fortaleza Station facilities and geodetic VLBI and GPS operations are managed in site by Eng. A. M. P. de Lucena (CRAAE/INPE), assisted by Eng. Adeildo Sombra da Silva (CRAAE/Mackenzie), and technician Avicena Filho (CRAAE/INPE). Local administrative support was given by Dadimar Dias Nobre.

### 4. Geodetic VLBI Observation

Fortaleza participated in following geodetic VLBI experiments, as detailed in the table below for the year 2003.

Experiment	Number of Sessions
IVS-R4	50
IVS-T2	07
IVS-CRF	03
IVS-OHIG	06

### 5. Development and Maintenance Activities in 2003

Considerable attention was given to technical maintenance problems, specially to the following ones:

1. Tests and electrical alignment of the DC motors in both axis.
2. Up-dating and tests for new versions of Field System.
3. Repair on cryogenic system with replacement of cold head.
4. Repairs on the following circuits, modules, or systems: Mark III video converters, Mark III power supplies and Mark III IF3 module.
5. Maintenance of web site (<http://www.roen.inpe.br>).

### 6. GPS Operation

The IGS network GPS receiver operated regularly at all times during 2003. Data were collected and uploaded to IGS/NOAA computer.

## 7. Students Activities

The following students have participated in the program during 2003:

1. Carlos Fabiano Barros Moreira(CEFET/CE), ROEN;
2. Jose Ronnylson Santos dos Anjos(CEFET/CE), ROEN;
3. Danilo Morales Teixeira(FBCEE/UPM), CRAAM-SP.

## 8. Scientific Paper

TATEYAMA, C.E.; KINGHAM, K.A.; "Structure of OJ 287 from Geodetic VLBA Data", in press, *Astrophys.J.*, 2003.

## 9. Visitors

In 2003 we received at ROEN the visits from Mr. William T. Wildes, the program manager at GSFC/NASA and Mr. Charles Kodak, from Honeywell, for technical inspections and discussions.

## 10. ROEN Participation in TOW

Engineer Adeildo Sombra da Silva, from ROEN, has participated in the IVS Technical Operations Workshop (TOW), held by IVS, at Haystack Observatory, MIT, Massachusetts, USA, September 21-25 2003.

## 11. Future Plans

The Mark IV formatter was purchased and received in 2003. It is planned to complete the Mark III updating during 2004.