

# Goddard Geophysical and Astronomical Observatory

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## Abstract

This report summarizes the technical parameters and the technical staff of the VLBI system at the fundamental station GGAO. It also gives an overview about the VLBI activities during the previous year. The outlook lists the outstanding tasks to improve the performance of GGAO.

## 1. GGAO at Goddard

The Goddard Geophysical and Astronomical Observatory consists of a radio telescope for VLBI, SLR site to include MOBLAS-7, SLR-2000 (development system), a 48" telescope for developmental two color Satellite Ranging, a GPS timing and development lab, meteorological sensors and a H-maser. In addition, we are a fiducial IGS site with several IGS / IGSX receivers.

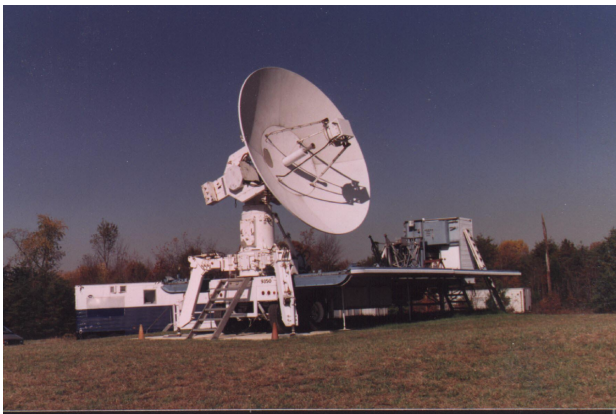


Figure 1. Old semi permanent MV3 VLBI antenna.



Figure 2. New permanent MV3 antenna.

GGAO is located on the east coast of the United States in Maryland. It is about 15 miles NNE of Washington D.C. in Greenbelt, Maryland (Table 1).

## 2. Technical Parameters of the VLBI Antenna at GGAO

The radio telescope for VLBI at GGAO (MV3) was originally built as a mobile or transportable station. It was previously known as Orion and was part of the original CDP. It is now being used as a fixed site having been moved to Goddard and semi-permanently installed here since the spring of 1991 as shown in Figure 1. In the winter of 2002 the antenna was taken off its trailer and permanently installed at GGAO as shown in Figure 2. The design criteria were

- transportability on two tractor trailers utilizing a 5 meter dish size to maximize receive and mobility considerations,
- setup of the radio telescope within eight hours (although it has been used as a fixed site since the spring of 1991)

Table 1. Location and addresses of GGAO at Goddard.

Longitude	76.4935° W
Latitude	39.0118° N
MV3 Code 299.0 Goddard Space Flight Center, (GSFC) Greenbelt, Maryland 20771	
<a href="http://www.gsfc.nasa.gov">http://www.gsfc.nasa.gov</a>	

The technical parameters of the radio telescope are summarized in Table 2.

Table 2. Technical parameters of the radio telescope of GGAO for geodetic VLBI.

Parameter	GGAO-VLBI
owner and operating agency	NASA
year of construction	1982
diameter of main reflector $d$	5m
azimuth range	0... 540°
azimuth velocity	3°/s
azimuth acceleration	1°/s <sup>2</sup>
elevation range	0... 90°
elevation velocity	3°/s
elevation acceleration	1°/s <sup>2</sup>
X-band	8.18 – 8.98 GHz
receiving feed	Cassegrain focus
$T_{sys}$	24 K
Bandwidth	800MHz, -2dB
$G/T$	32.1 dB/K
S-band	2.21 – 2.45GHz
receiving feed	primary focus
$T_{sys}$	19 K
Bandwidth	240MHz, -2dB
$G/T$	21.2 dB/K
VLBI terminal type	Mark IV
recording media	thin-tape, Mark 5
Field System version	9.7.1 (9.5 BETA)

### 3. Technical Staff of the VLBI Facility at GGAO

The GGAO VLBI facility gains from the experiences of the staff from the Research and Development VLBI support staff. GGAO is a NASA R&D and data collection facility, operated under

contract by Honeywell Technology Solutions Incorporated (HTSI). Table 3 lists the GGAO station staff that are involved in VLBI operations.

Table 3. Staff working at the MV3 VLBI station at GGAO.

Name	Background	Dedication	Agency
Jay Redmond	engineering technician	100%	HTSI
Skip Gordon	engineering technician	20%	HTSI

#### 4. Status of MV3 at GGAO

GGAO participated in several VLBI experiments which are listed in Table 4. In addition to the scheduled experiments listed in Table 4, MV3 has participated in several unscheduled experiments for VLBI developmental purposes and various other developmental activities.

Table 4. Participation of GGAO in VLBI Experiments from February 1, 2005 to December 20, 2005.

Date	Experiment
2005-02-01	T2037
2005-02-09	RDV49
2005-04-27	RDV50
2005-06-29	RDV51
2005-08-24	RDV52
2005-09-18	T2040
2005-09-26	IG269
2005-09-28	RDV53
2005-10-14	sc5318
2005-12-14	RDV54
2005-12-20	T2042

#### 5. Outlook

GGAO will continue to support both scheduled experiments and developmental activities. The plan for 2005 consists of:

1. Continue testing of pre-release versions of PC-FS and new Linux kernel releases.
2. Continue with research on Mark 5 hardware development.
3. Continually striving to improve the performance of the entire Mark IV data collection and station specific equipment.
4. MV3 has installed the Mark 5 and e-VLBI hardware and has begun testing real-time from GGAO to Haystack. Correlation with the Westford data on the Mark IV correlator was successful. (Oct 24, 2002).

5. The MV3 antenna at GGAO has been permanently fixed to the ground and has been resurveyed. (Oct. 2003)