

## Matera CGS VLBI Station

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### Abstract

This report describes the status of the Matera VLBI station. Also, in an overview of the station, some technical characteristics of the system, and staff addresses are given.

### 1. General



Figure 1. The Matera “Centro di Geodesia Spaziale” (CGS).

The Matera VLBI station is located at the Italian Space Agency’s ‘Centro di Geodesia Spaziale G. Colombo’ (CGS) near Matera, a small town in the south of Italy. The CGS came into operation in 1983 when the Satellite Laser Ranging SAO-1 System was installed at CGS. Fully integrated into the worldwide network, SAO-1 was in continuous operation from 1983 up to 2000, providing high precision ranging observations of several satellites. The new Matera Laser Ranging Observatory (MLRO), one of the most advanced Satellite and Lunar Laser Ranging facilities in the world, was installed in 2002 and replaced the old SLR system. CGS also hosted mobile SLR systems MTLRS (Holland/Germany) and TLRs-1 (NASA).

In May 1990, the CGS extended its capabilities to Very Long Baseline Interferometry (VLBI), installing a 20-m radio telescope. Since then, Matera has observed in 876 sessions up through December 2012.

In 1991 we started GPS activities, participating in the GIG 91 experiment and installing at Matera a permanent GPS Rogue receiver. In 1994 six TurboRogue SNR 8100 receivers were purchased in order to create the Italian Space Agency GPS fiducial network (IGFN). At the moment 12 stations are part of the IGFN, and all data from these stations, together with 24 other stations in Italy, are archived and made available by the CGS Web server GeoDAF (<http://geodaf.mt.asi.it>).

In 2000 we started activities with an Absolute Gravimeter (FG5 Micro-G Solutions). The gravimeter operates routinely at CGS, and it is available for external campaigns on request.

Thanks to the co-location of all precise positioning space based techniques (VLBI, SLR, LLR, and GPS) and the Absolute Gravimeter, CGS is one of the few “fundamental” stations in the world. With the objective of exploiting the maximum integration in the field of Earth observations, in the late 1980s ASI extended CGS’ involvement also to remote sensing activities for present and future missions (ERS-1, ERS-2, X-SAR/SIR-C, SRTM, ENVISAT, and COSMO-SkyMed).



Figure 2. MLRO in action.

## 2. Technical/Scientific Overview

The Matera VLBI antenna is a 20-meter dish with a Cassegrain configuration and an AZ-EL mount. The AZ axis has  $\pm 270$  degrees of available motion. The slewing velocity is 2 deg/sec for both the AZ and the EL axes.

The technical parameters of the Matera VLBI antenna are summarized in Table 1.

The Matera time and frequency system consists of three frequency sources (two Cesium beam and one H-maser standard) and three independent clock chains. The EFOS-8 H-maser from Oscilloquartz is used as a frequency source for VLBI.

Table 1. Matera VLBI Antenna Technical Specifications.

Input frequencies	S/X	2210–2450 MHz / 8180–8980 MHz
Noise temperature at dewar flange	S/X	<20 K
IF output frequencies	S/X	190–430 MHz / 100–900 MHz
IF Output Power (300 K at inp. flange)	S/X	0.0 dBm to +8.0 dBm
Gain compression	S/X	<1 dB at +8 dBm output level
Image rejection	S/X	>45 dB within the IF passband
Inter modulation products	S/X	At least 30 dB below each of two carriers at an IF output level of 0 dBm per carrier
$T_{sys}$	S/X	55/65 K
SEFD	S/X	800/900 Jy

## 3. Staff

The list of the VLBI staff members of the Matera VLBI station is provided in Table 2.

Table 2. Matera VLBI staff members.

Name	Agency	Activity	E-Mail
Dr. Giuseppe Bianco	ASI	Space Geodesy Manager	giuseppe.bianco@asi.it
Francesco Schiavone	e-geos	Operations Manager	francesco.schiavone@e-geos.it
Giuseppe Colucci	e-geos	VLBI contact	giuseppe.colucci@e-geos.it

## 4. Status

In 2012, 52 sessions were observed. Figure 3 shows a summary of the total acquisitions per year, starting in 1990.

In 2004, in order to fix the existing rail problems, a complete rail replacement had been planned. In 2005, due to financial difficulties, it was instead decided that only the concrete pedestal under the existing rail would be repaired. From then on, no rail movements have been noted [1]-[3].

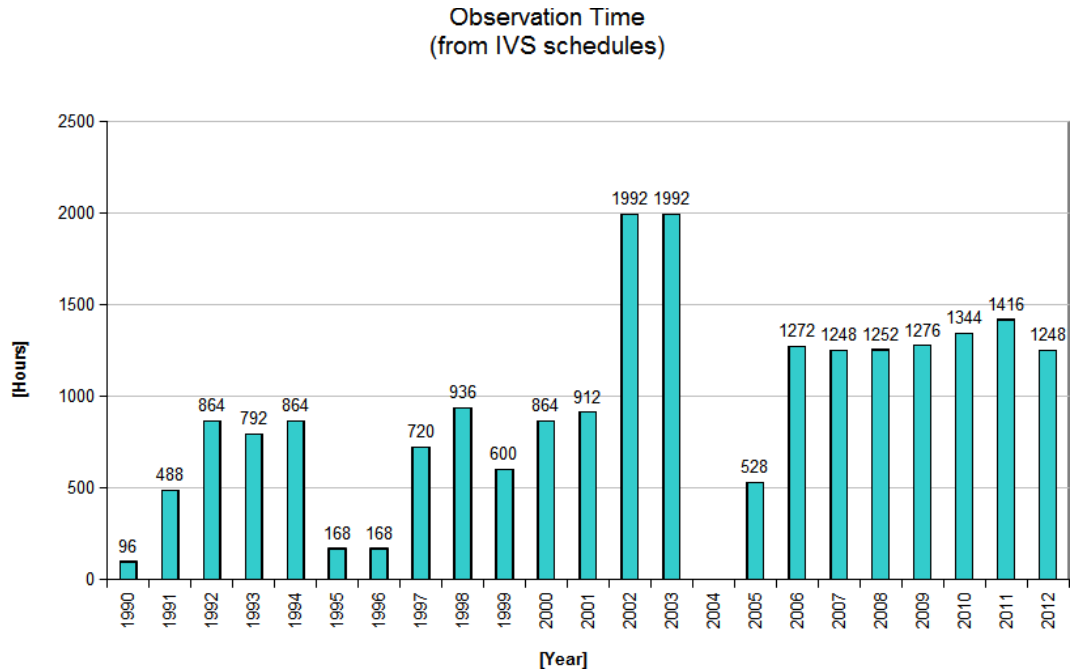


Figure 3. Acquisitions per year.

## 5. Outlook

In order to plan the eventual building of a VLBI2010 system, the fund raising investigation process has been started. At this moment it is not clear when the budget for starting the project will be ready.

In May 2012, the remaining two azimuth wheels were replaced. The other two were replaced in 2008 and 2009 respectively.

The process of purchasing a new H-Maser has been already started. The delivery of the new unit is planned for 2013.

## References

- [1] M. Mannarella “Relazione sulle misure effettuate sulla rotaia dell’antenna VLBI”, Telespazio doc. OT-SPA-SM\_REL\_180010\_1140\_0222, 21/01/2004.
- [2] M. Mannarella “Misure sugli spostamenti indotti sulle piastre e sulla rotaia dell’antenna VLBI”, Telespazio doc. OT-SPA-SM\_REL\_180010\_1320\_0661, 06/04/2005.
- [3] M. Mannarella “Relazione sull’esito dei lavori di ripristino delle parti ammalorate della fondazione dell’antenna VLBI”, Telespazio Doc. OT-SPA-SM\_REL\_180010\_1320\_0732, 27/06/2005.