

Matera CGS VLBI Station 2015–2016 Biennial Report

Giuseppe Bianco¹, Giuseppe Colucci², Francesco Schiavone²

Abstract This report presents the status of the Matera VLBI station. An overview of the station, some technical characteristics of the system, and staff addresses are also given.

1 General Information

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. Fully integrated into the worldwide network, SAO-1 was in continuous operation from 1983 through 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, replacing 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 982 sessions up through December 2016.

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 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 to include remote sensing activities for present and future missions (ERS-1, ERS-2, X-SAR/SIR-C, SRTM, ENVISAT, and COSMO-SkyMed).

The Matera VLBI antenna is a 20-meter dish with a Cassegrain configuration and an AZ-EL mount. The AZ axis has ± 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 beams and one H-maser standard) and three independent clock chains. The iMaser 3000 H-maser from Oscilloquartz is used as a frequency source for VLBI.

1. Agenzia Spaziale Italiana

2. e-geos - an ASI/Telespazio company

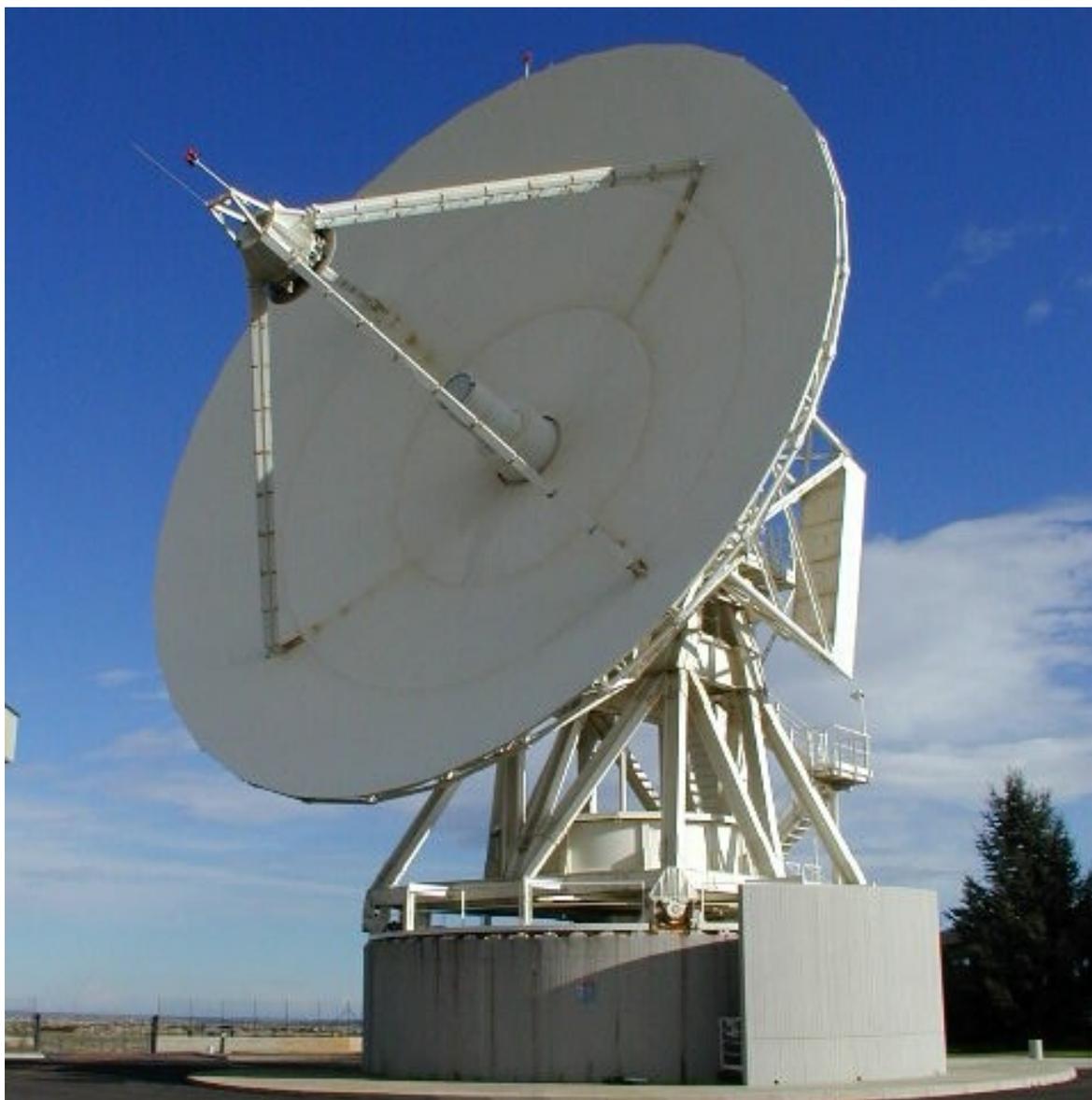


Fig. 1 VLBI antenna.

2 Activities during the Past Years

The VLBI frequency standard is a T4SCIENCE iMaser 3000 installed in 2013.

Specifications for this new maser can be found here: http://www.t4science.com/product/imaser_3000.

3 Current Status

In 2015 and 2016, 52 and 53 sessions were observed respectively. Figure 2 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 was planned. In 2005, due to financial difficulties, it was instead decided that only the concrete pedestal under the existing rail would be

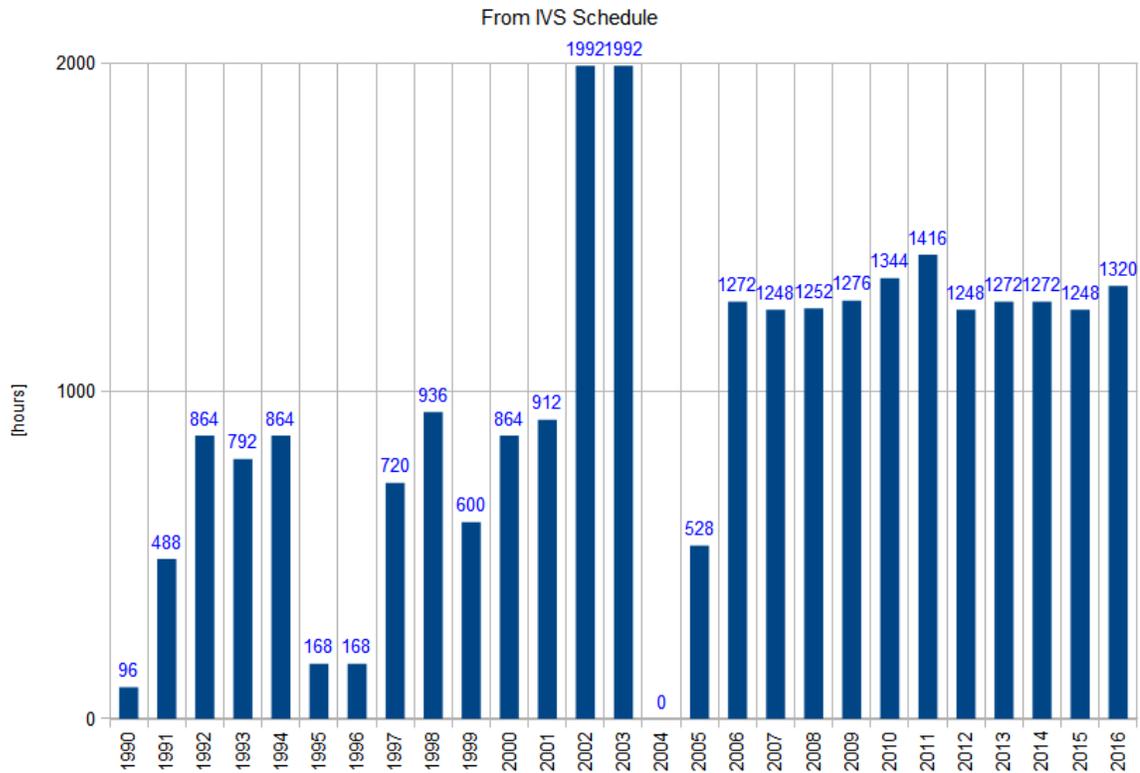


Fig. 2 Observation time.

Table 1 Matera antenna technical specification.

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

repaired. From then on, no rail movements were noted [1, 2, 3].

4 Future Plans

In order to plan the eventual building of a VGOS system, the fund raising investigation process has begun. Financing is on the first stage of ASI approval process.

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.