Matera CGS VLBI Station

Giuseppe Bianco, Giuseppe Colucci, Francesco Schiavone

Abstract

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

1. General

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

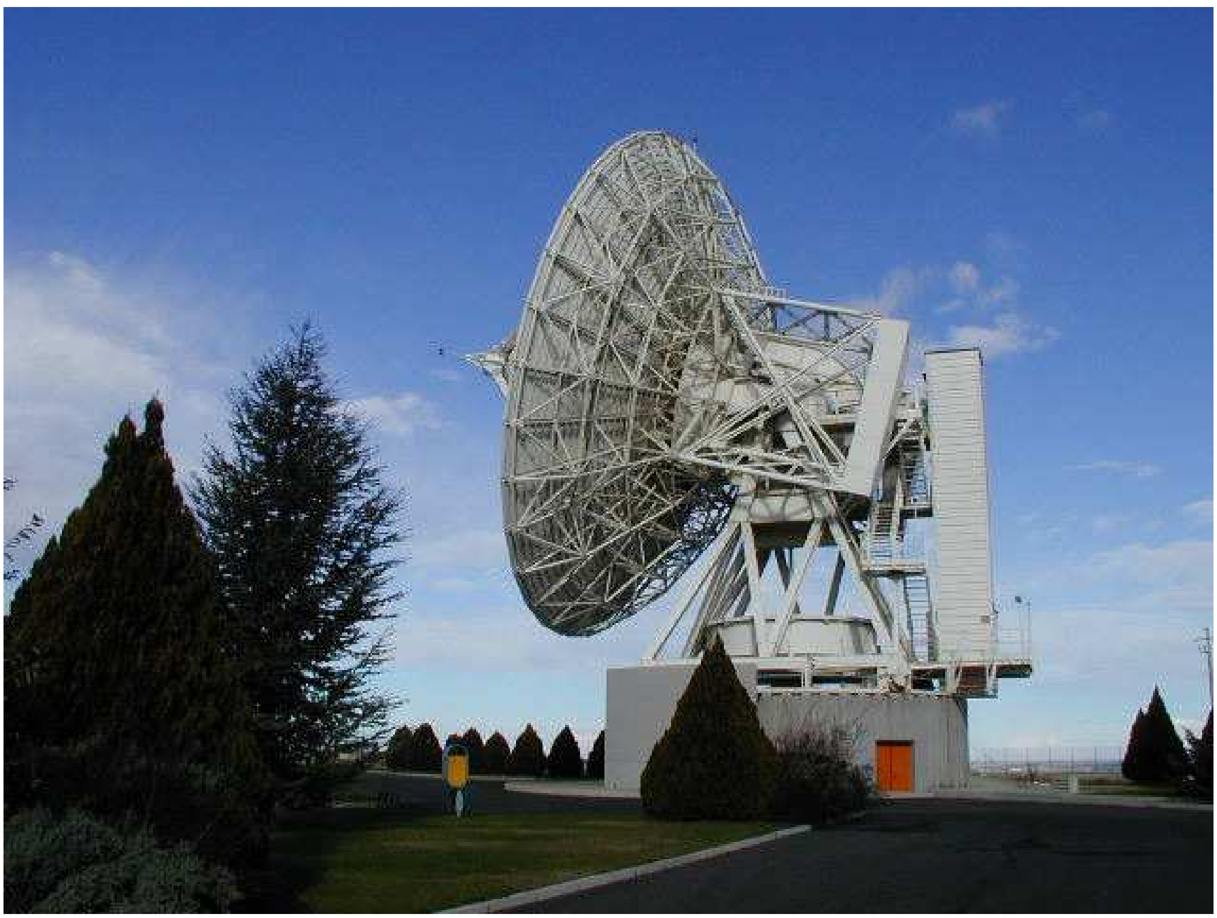

Figure 1. The Matera "Centro di Geodesia Spaziale" (CGS).

in 1983 when a Satellite Laser Ranging SAO-1 System was installed at CGS. Fully integrated in 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, has been installed in 2002 and replaced the old SLR system. CGS hosted also 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 radiotelescope. Since then, Matera performed 761 sessions up to December 2007.

In 1991 we started GPS activities, participating in the GIG 91 experiment installing in 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 WWW server GeoDAF (http://geodaf.mt.asi.it).

Thanks to the co-location of all precise positioning space based techniques (VLBI, SLR, LLR and GPS), 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, COSMO-SkyMed).

2. Technical/Scientific Overview

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

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.

The control computer is a SWT Pentium/233 PC running Linux and FS version 9.9.2.

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 2 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 Matera VLBI station is provided in Table 2.

Table 2. Matera VLBI staff members.

Name	Agency	Activity	E-Mail
Dr. Giuseppe Bianco	ASI	VLBI Manager	giuseppe.bianco@asi.it
Francesco Schiavone	Telespazio	Operations Manager	francesco.schiavone@telespazio.com
Giuseppe Colucci	Telespazio	VLBI contact	giuseppe.colucci@telespazio.com

4. Status

In 2007, 52 sessions were acquired. All sessions were acquired using Mark 5 only. Fig. 2 shows the total Acquisitions Summary per year, starting in 1990.

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

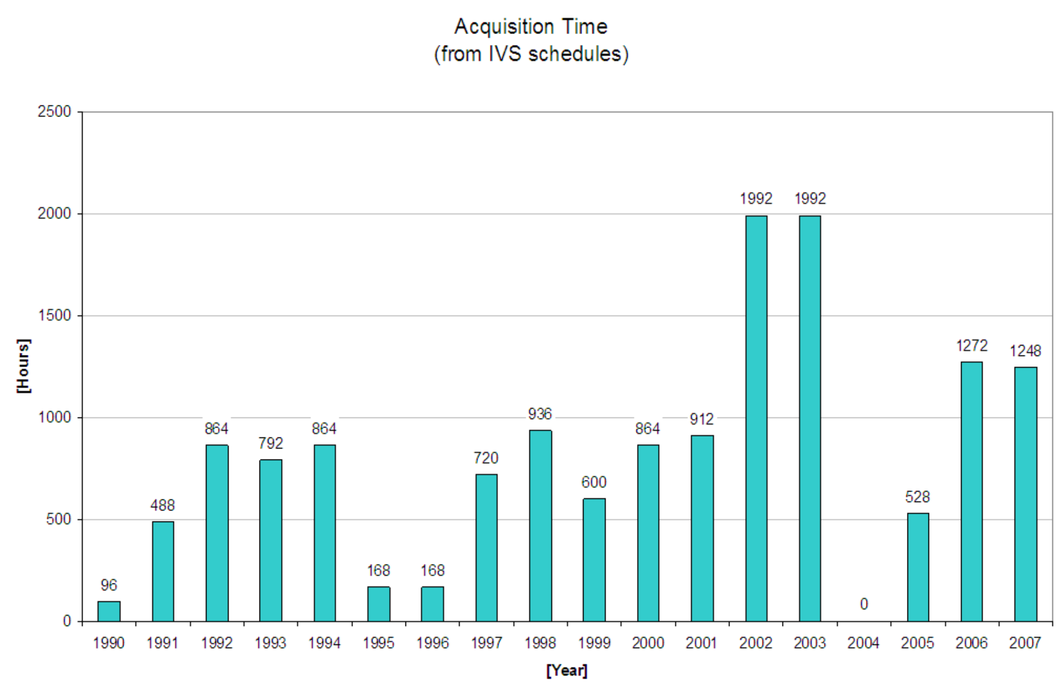

Figure 2. Acquisitions per year.

5. Outlook

The rail works are now on low priority because during last year no significant deterioration has been noted.

The main goal is to replace at least 1 of the 4 azimuth wheels because of cracks on the surface. This important work should be done in May-June 2008.

Another goal is to replace the Antenna Control Unit and both Azimuth and Elevation encoders, because it is not possible to find spare parts for these components anymore.

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.