Matera CGS VLBI Station

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Abstract

This report summarises the VLBI activities performed at the Matera VLBI station. Also an overview of the technical characteristics of the system and some staff addresses will be given.

1. General

The Matera VLBI station is located at the Italian Space Agency "Centro di Geodesia Spaziale" (CGS) near Matera, a small town in the South of Italy. The CGS came into operation in 1983 when

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

a Satellite Laser Ranging SAO-1 System was installed at CGS. Fully integrated in the worldwide network, SAO-1 has been in continuous operation from 1983 up to 2000, providing high precision ranging observations of several satellites. The new Matera Laser Ranging Observatory (MLRO), the most advanced Satellite and Lunar Laser Ranging facility in the world, has been installed in 2001 and has 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 466 experiments up to December 2001. In 1996 the receiver was upgraded to standard wideband and at the end of 1999 a Mark IV formatter and decoder were installed by MIT Haystack.

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 11 stations are part of the IGFN and all data from these stations, together with 11 other stations in Italy, are archived and made available by the CGS WWW server GeoDAF (http://geodaf.mt.asi.it).

At the beginning of 1996 the operations of the Precision RAnge and Range-rate Experiment (PRARE) started. Thanks to the colocation of all precise positioning space based techniques (VLBI, SLR, LLR, GPS and PRARE), 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 in remote sensing activities for present and future missions (ERS-1, ERS-2, X-SAR/SIR-C, SRTM, ENVISAT).

2. Technical/Scientific

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 summarised in Table 1.

The Matera Time and Frequency system is composed 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 9.4.18.

Table 1. Matera VLBI Antenna Technical Specifications

Input frequencies	S/X	2210 MHz to 2450 MHz / 8180 MHz to 8980 MHz
Noise temperature at dewar flange	S/X	<20 K
IF output frequencies	S/X	190 MHz to 430 MHz / 100 MHz to 900 MHz
IF Output Power with 300 K at the input 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	Head, CGS	giuseppe.bianco@asi.it
Domenico Del Rosso	Telespazio	Operations Manager	domenico_delrosso@telespazio.it
Giuseppe Colucci	Telespazio	VLBI contact	giuseppe.colucci@asi.it

4. Status

The Matera station is involved in CORE and EUROPE experiments. Table 3 summarizes the experiments performed during 2001. Figure 2 shows the summary of acquisition up to December 2001 in terms of hours of acquisition. Starting from May up to the first half of July, the antenna was not operative due to a motor reduction unit failure. The antenna worked using only 2 motors instead of 4 from second half of July up to November when a spare motor reduction unit was installed.

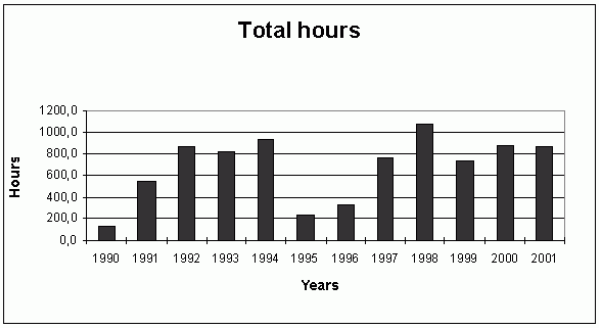

Figure 2. Summary of acquisition from May 1990 to December 2001

References

[1] G.Colucci, D.Del Rosso, L.Garramone: "Matera VLBI Station Report on the Operational and Performance Evaluation Activities from January to December 2001", available on-line at this address: http://geodaf.mt.asi.it/GDHTL/matera.html

Table 3. Summary of experiments

Month	CORE	EUROPE	NEOS	RDV	Others
January	1		1	1	
February	3		1		
March	1		3	1	2
April	1		1	1	
May	2 (lost)		1 (lost)	1 (lost)	
June	2 (lost)	1 (lost)			
July	2			1 (lost)	
August	1				
September	2	1			
October	2		2	1	
November	3		2		
December	1	1	1		
TOTAL	**21**	**3**	**12**	**6**	**5**