

Fundamentalstation Wettzell - 20m Radiotelescope

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Abstract

In 2003 the radiotelescope in Wettzell contributed strongly to the IVS observing program. The transition to the Mark 5A system has been completed for routine operation, a 34 Mbps Internet link has been installed for first e-VLBI activities. Technical upgrades have been done.

1. General Information

The radiotelescope in Wettzell (RTW) is jointly operated by the Bundesamt für Kartographie und Geodäsie (BKG) and the Forschungseinrichtung Satellitengeodäsie/Technical University of Munich (FESG) within the frame of the Forschungsgruppe Satellitengeodäsie (FGS).

At the Fundamentalstation Wettzell (FSW) the 20m Radiotelescope (RTW) for VLBI is collocated with three more geodetic space technique systems:

- the Laser ranging system WLRS (Wettzell Laser Ranging System) designed for SLR and LLR,
- several GPS receivers, integrated in the global IGS, the European GPS, and in the national GPS network, and for time transfer experiments,
- a DORIS station on loan from CNES/France.

At the Wettzell observatory, the first ringlaser, “G” dedicated to the monitoring of the variations in Earth rotation has been developed in close cooperation with the University of Canterbury-New Zealand. The system was established in 1998 to 2001 and is operating since fall 2001. “G” is sensitive to monitoring daily variations better than 10^{-8} relative accuracy.

Additional in situ observations were carried out such as:

- gravity observations, employing a super conducting gravity meter
- earth quake observations with a seismometer
- meteorological observations to monitor pressure, temperature and humidity, rain fall, wind speed, wind direction and also
- water vapour observations with a radiometer.

A Time and Frequency system (T&F) is established for the generation of timescales (UTC(IfAG)) and for the provision of very precise frequencies needed for VLBI, SLR/LLR and GPS observations, employing Cs-clocks and H-Masers and GPS time receivers. The timescale UTC(IfAG) is published in the monthly Bulletin T of the BIPM.

The 20m radiotelscope (RTW) has been established during the period 1980 to 1983. First observations were performed in 1983, routine operation started 1984. Since that time the telescope contributed strongly and continuously to many geodetic VLBI measurements.



Figure 1. View of the FundamentalStation Wettzell

2. Staff

The staff of the Fundamentalstation Wettzell consists in total of 35 members for operating, maintaining and improving all the devices, and developing new systems. Within the responsibility of the Fundamentalstation Wettzell are the TIGO systems, operated in Concepcion-Chile jointly with a Chilean partner consortium with 3 experts from Wettzell, and the O'Higgins station, jointly operated with the German Space Center (DLR) and the Institute for Antarctic Research Chile (INACH). The staff operating the 20m radiotelescope in Wettzell (RTW) is summarized in the table 1.

3. Observations in 2003

The RTW was scheduled in 2003 in total for 122 24 hr experiments of the IVS observing program. In addition it was scheduled four days per week in the INTENSIVE observations with Kokee Park. On many Saturdays the Intensive observations with Tsukuba, employing K4 recording technique were performed for about one hour. In comparison with the IVS telescopes, the RTW observed most of all. The table 2 summarizes the participation of RTW in the 24 hr observation sessions.

It has to be mentioned that during the VLBI sessions the DORIS is switched off in order to avoid interference.

Table 1. Staff - members

Name	Affiliation	Function	Working for
Wolfgang Schlüter	BKG	Head of the FSW	RTW, TIGO, O'Higgins
Richard Kilger	FESG	Group leader RTW	RTW
Eberhard Bauernfeind	FESG	mechanical engineer	RTW
Ewald Bielmaier	FESG	technician	operator RTW
Gerhard Kronschnabl	BKG	electronic engineer	RTW, TIGO (partly), O'Higgins (partly)
Christian Plötz	BKG/FESG	electronic engineer	O'Higgins, RTW
Raimund Schatz	FESG	software engineer	RTW
Walter Schwarz	BKG	electronic engineer	RTW, O'Higgins
Reinhard Zeithöfler	FESG	electronic engineer	RTW
Rudolf Zerneck	FESG	survey engineer	RTW, TIGO (partly)

Table 2. RTW participation in the IVS 24 hr observing program

program	number of sessions
IVS R1	50
IVS R4	49
IVS R&D	10
IVS T2	3
VLBA	6
EUROPE	4
VIE	1
in total	122

4. Maintenance

The intensive use of RTW requires maintenance in particular to avoid failures during the observations. Many problems have been caused by failures of the receiver cooling system, which mostly occur during hot summer periods. A lot of effort has been made to repair and to improve the cooling system. The antenna control unit (ACU) fails randomly, the reasons are unknown. If the ACU fails a restart is usually required. Azimuth motors had to be replaced and worn out couplings between the motor and the transmission had to be replaced. Random failures occurred also due to the shared memory of the FieldSystem with specific RTW software. This problem was solved and no further failures were observed due to that problem.

5. Technical Improvements

The transition from the Mark 4 to the Mark 5A via Mark 5P has been successfully completed. Two Mark 5A systems were integrated, one of the units is modified for the Intensive observations as Intensives only require one hard disk per experiment and not a complete 8-pack. The second

unit is used as a spare and also to test and to develop e-VLBI procedures. The tapes drives still are available.

First tests for e-VLBI were performed in order to investigate the problems which occur on the national and intercontinental links. A 34 Mbps Internet connection is installed, for which the support is affordable. The link can be extended to 155 Mbps, as soon as it is affordable. The 34 Mbps links allow the transmission of Intensive data to the correlator. Still a lot of work and coordination is needed.

The last FieldSystem version was implemented.

6. Upgrade Plans for 2004

During 2004 it is planned to replace the ACU in order to overcome the random failures which could not be explained. The e-VLBI procedure for Intensive observations should be set up and an upgrade of the Mark 5A to Mark 5B is foreseen.