Station Report of the 20m Radiotelescope at Wettzell

Richard Kilger, Ehrhard Bauernfeind, Gerhard Kronschnabl, Raimund Schatz, Walter Schwarz, Reinhard Zeitlhöfler, Rudolf Zernecke

Abstract

As in past years, the main activities in the year 2000 with the 20m Radiotelescope Wettzell have been concentrated on participation in geodetic and astrometric observing programs of the IVS. Some technical improvements have been carried out during regular maintenance. A GPS receiver has been placed on top of the radiotelescope, right behind the secondary reflector for measuring deformations of the 20m antenna and for deriving elevation dependencies of the GPS antenna. A repetition of the local survey has been performed in order to control the ties of the reference point of the VLBI telescope to the other geodetic systems.

1. Participation in the Observing Programs

Since 1983 the Radiotelescope Wettzell has contributed to geodetic and astrometric observing programs. Extended times series exist for the station position and for the velocity. In 2000 the 20m Radiotelescope participated in experiments. Due to the transition of the MKIII to MKIV

Table 1. Summary of observation activities.

52	NEOS-A
12	IRIS-S
228	DUT1 Intensive
7	EUROPE
6	RDV
6	CORE
3	Astronomy

correlator, which limited the correlator throughout 2000, the amount of observation was slightly less compared to the previous years.

Due to consequent maintenance the system failures have been minimized; nevertheless some components failed and resulted in loss of observations. Unexplained problems in the interference resistance were the reason for unexpected failures of the Antenna Control Unit (ACU), which required occasionally a reset. Unexpected power failures e.g. during lightning led to failures of the cooling system of the S/X receiver. Both events occasionally caused losses of tracks.

2. Technical Improvements

Some technical improvements have been made in order to increase reliability and automation. The current implemented Field System version is FS-9.4.18. A software routine has been set up which automatically controls the transfer of log files and schedule files to and from the respective data bases to make sure that the last versions of those files were received. As an extension to the regular Field System a software routine has been implemented which allows tracking of satellites. So far an old HP 5316A counter was used for measuring the cable delays and the fmout - gps values. The old system has been replaced by an HP 53132A counter. The required GPIB driver has been written for the integration into the Field System.

Last year the automatic antenna control unit was replaced by a new system. Due to unexplained effects, occasionally unexpected interferences occurred and resulted in undefined status of the ACU. This leads to failures of the 20m antenna. In 2000 some efforts and investigations have been made to overcome the problem. So far it has been minimized but not sufficiently solved. Actions were the employment of an uninterruptable power supply, the replacement of the RS232 connection by fiber optics and improvements in grounding. Futher investigations are ongoing.

The MKIII decoder has been replaced by a MKIV unit.

The thermal insulation of the antenna concrete support construction (basement up to the moving part), which minimizes the influence of the direct sunshine to the construction, has been completely replaced. Over the years water penetrated the shielding and decreased the insulation capacity (figure 1).

Figure 1. 20m radiotelescope with new insulation of the concrete supporting construction.

A K4 system – on loan from the Communications Research Laboratory (CRL) / Japan – had to be removed and returned at the end of 2000. The system has been used for joint observations with Tsukuba and Kashima. We are obliged to thank CRL for having the system for a long time in Wettzell.

3. Local Survey

A GPS antenna (ASHTECH-Choke ring) was installed behind the secondary reflector centered on the telescope pointing axis (figure 2). The receiver itself was placed in the elevation cabin to monitor GPS observations. The objective is to observe bending or deformation of the 20m antenna and to derive elevation dependencies of the GPS antenna. Usually, when no VLBI program is observed and the 20m antenna is not in use for some hours, GPS observations should be taken. GPS derived positions will be compared with the positions derived by taking into account the

VLBI reference point and the corresponding eccentricities calculated from the pointing angles of the antenna and the radial distance between GPS and Antenna reference point. So far observations have been taken at various elevation and various azimuth positions.

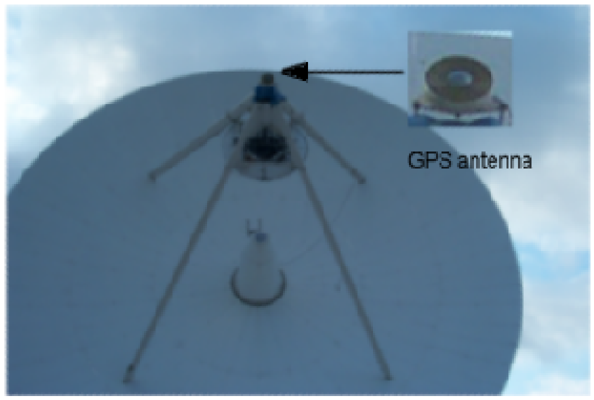

Figure 2. GPS Antenna mounted behind the Secondary Reflector in line of the pointing axis.

The measurements employing an invar wire for measuring the variations in height due to temperature variations in the telescope support structure have been performed successfully in 2000. Figure 3 shows the time series. The replacement of the reference mass of 1kg by 2kg at the lower end of the wire changed the zero point by a constant offset in February 2000.

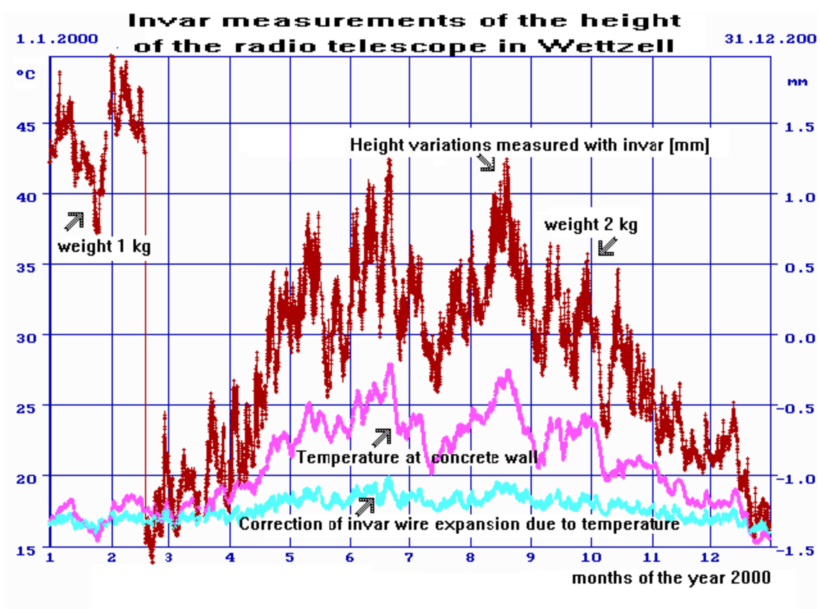

Figure 3. Height variations of the VLBI reference point due to temperature, measured with an invar wire.

The local survey of the Fundamentalstation Wettzell has been repeated for the control of the local ties between the various geodetic systems and for the inclusion of the new Lasergyroscope "G". The local network is shown in figure 4.

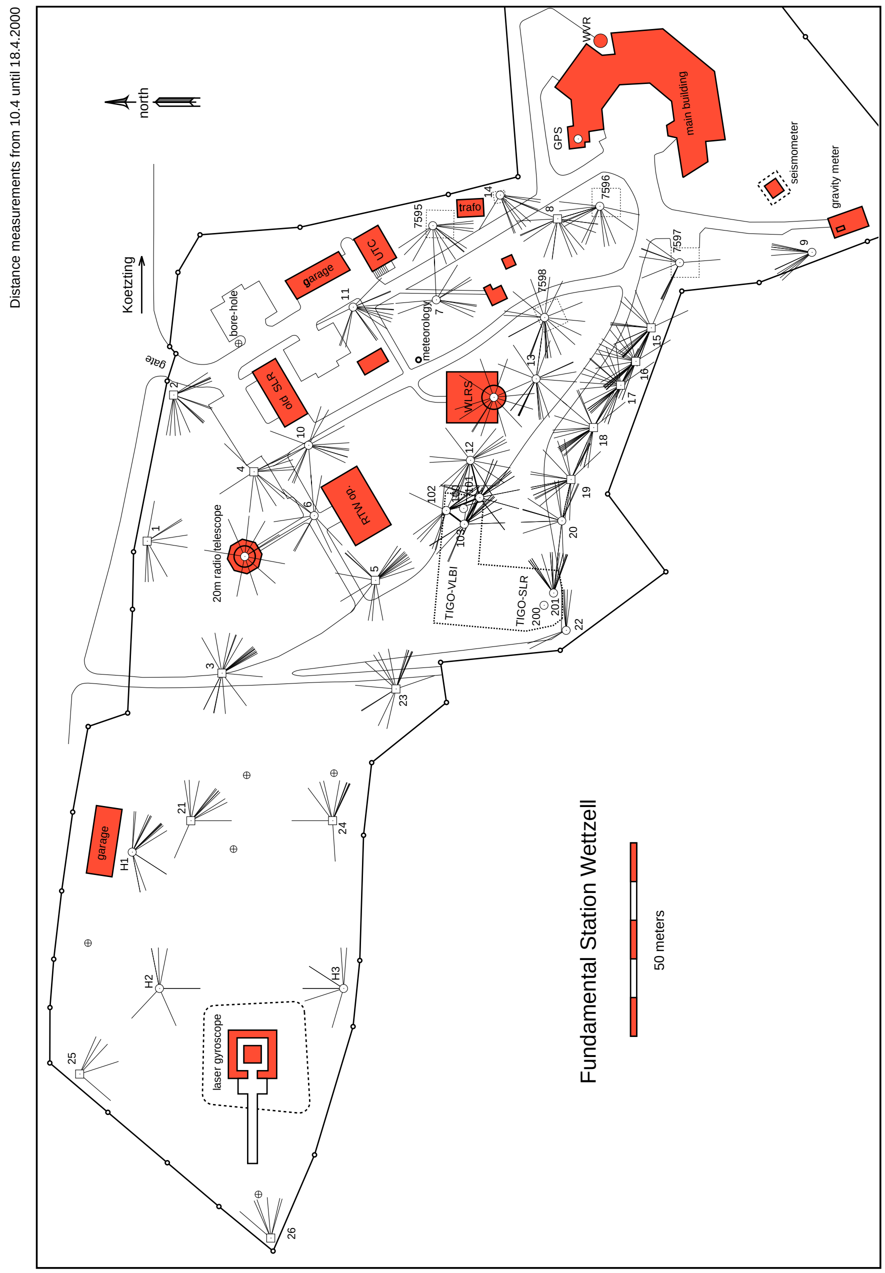

Figure 4. Local survey network of Fundamentalstation Wettzell.