

Yellowknife Observatory

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Abstract

The Yellowknife VLBI antenna is a 9-meter diameter antenna which was formerly the “MV-1” mobile antenna. The MV-1 was a proof-of-concept for mobile VLBI and in 1991 NASA and NOAA offered the system for use at Yellowknife.

The antenna is located at the Yellowknife Geophysical Observatory and is operated by the Geodetic Survey Division, Natural Resources Canada as part of the active control of the Canadian Spatial Reference System. This report gives an update on recent activities.



Figure 1. Dismantling the Yellowknife 9m antenna.

1. Overview

Formerly the “MV-1” mobile antenna, the Yellowknife antenna was used as a proof-of-concept for mobile VLBI under the ARIES (Astronomical Radio Interferometric Earth Surveying) program.

Following the successful proof-of-concept, the MV-2 and MV-3 mobile antennas were built and used extensively during NASA’s Crustal Dynamics project. The MV-1 antenna was then stationed at Vandenberg Air Force Base. In 1991 NASA and NOAA offered the system to Energy, Mines and Resources, Canada, for use at Yellowknife. With support of the Crustal Dynamics Project the Yellowknife VLBI observatory saw first light in Yellowknife in the summer of 1991.

The antenna is located at the Yellowknife Geophysical Observatory and is the responsibility of the Geodetic Survey Division, Natural Resources Canada. The Yellowknife Geophysical Observatory is operated by the Geological Survey of Canada, Pacific Division, Natural Resources Canada. It served as a second VLBI point for the Canadian Spatial Reference System (CSRS) in Canada.

2. General Specifications

- Latitude : 62.48 North
- Longitude : 114.48 West
- Elevation : 181.0 m
- Reflector : 9m
- Receiver : S and X cryogenic
- Azimuth speed : 40 degrees per minute
- Elevation speed : 40 degrees per minute
- PCFS version : 9.7.6
- VLBI equipment : Mark III and thick tape drive. S2 data acquisition and recording terminal.
- Time standard : NR Maser
- GPS receiver : BenchMark

3. Antenna Improvements

Since being installed in Yellowknife, the MV-1 has not required any major upgrades. The antenna is parked every winter because the antenna is unable to operate in low temperatures (November through March). Once spring arrives, the Yellowknife team prepares the antenna for the upcoming season.

Mechanical maintenance was performed in 1998 and the antenna has performed reasonably reliably since that time. An upgrade to the Mark III recorder was made prior to the 2006 observing season.

4. Antenna Survey

The Yellowknife antenna is surrounded by a high precision survey network which has been measured three times since 1990. This network has been precisely measured to obtain the geodetic tie between the VLBI, the GPS and the DORIS reference points with a precision of a few mm.

5. Operations January 2006 - December 2006

The E3 network was rescheduled in 2006 to provide more observations for the Yellowknife antenna. Though other stations in the network experienced some outages during this time, the Yellowknife Observatory had one of its most successful seasons.

In 2006, Yellowknife was involved in 3 IVS–T2 (Terrestrial Reference Frame sessions) and 8 IVS–E3 sessions.

On September 25, the Canadian government announced the cessation of Very Long Base Interferometry activities in Canada. Yellowknife VLBI operations ceased.