

Yellowknife Observatory

Mario Bérubé, Calvin Klatt, Anthony Searle

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. This report gives an update on recent activities.



Figure 1. A snowy Yellowknife Geophysical Observatory 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 came on the air in the summer of 1991.

The antenna is located at the Yellowknife Geophysical Observatory and is operated by the Geodetic Survey Division, Natural Resources Canada. The Yellowknife Geophysical Observatory is operated by the Geological Survey of Canada, Pacific Division, Natural Resources Canada.

2. General Specifications

- Latitude : 62.48 North
- Longitude : 114.48 West
- Reflector : 9m
- Receiver : S and X cryogenic
- Azimuth speed : 40 degrees per minutes
- Elevation speed : 40 degrees per minutes
- PCFS version : 9.5.3
- VLBI equipment : Mk 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 (December till 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. The antenna control unit was replaced with one similar to that at Algonquin. Last year, antenna reliability was improved by upgrading antenna drives.

Maintenance of NR maser was done as scheduled with power supply upgrade.

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 2003 - December 2003

In 2003 Yellowknife was involved in 4 IVS-T2 (Terrestrial Reference Frame sessions), and in 5 IVS-E3 sessions.