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. This report gives an update on recent activities.

Figure 1. Yellowknife Geophysical Observatory 9m VLBI 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 : 9 m
- Receiver : S and X cryogenic
- Azimuth speed : 40 degrees per minute
- Elevation speed : 40 degrees per minute
- PCFS version : 9.4.17
- VLBI equipment : Mk III and thick tape drive. S2 data acquisition and recording terminal.
- Time standard : NR Maser
- GPS receiver : AOA 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. Significant damage was sustained during a large thunderstorm and the Yellowknife team had to work very hard to keep the system running.

Yellowknife has had an S2 recording terminal and data acquisition system installed and a number of experiments have been performed using this equipment.

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 2001 - December 2001

In 2001 Yellowknife was involved in 3 CORE-C and 9 NEOS-A experiments. In addition, Yellowknife was involved in 9 CGLBI experiments.

In 2002 Yellowknife is currently scheduled to participate in 7 IVS E3 and 3 IVS T2 experiments. We anticipate that it will also participate in 5-10 CGLBI experiments.