# Algonquin Radio Observatory

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**Abstract**

The Algonquin Radio Observatory (ARO) is situated in Algonquin provincial park, about 250 km north of Ottawa and is operated by the Geodetic Survey Division (GSD) of Natural Resources Canada as a primary site for the Canadian Spatial Reference System.

The antenna is involved in a large number of international geodetic VLBI sessions each year and is a key site in the ongoing Canadian S2 developments. The ARO antenna is the most sensitive IVS Network Dish.

This report summarizes recent activities at the Algonquin Radio Observatory.

Figure 1. Algonquin Radio Observatory rests in its final position after 40 years of use.

## 1. Overview

The ARO 46-meter antenna was used in the first successful VLBI experiment in 1967 and was involved as early as 1968 in geodesy, when the baseline length between the ARO and a telescope in Prince Albert, Saskatchewan was measured to be 2143 km (sigma=20m).

GSD also maintains a permanent GPS monitoring station at Algonquin (ALGO) which is used by all IGS Analysis Centers as a fiducial reference. The site acts as a primary location

for the Canadian Spatial Reference System (CSRS), and ensures global consistency for reference frame users in Canada. Absolute gravity observations are available for the site which is located on the stable Precambrian Canadian Shield. A Satellite Laser Ranging observation campaign was conducted in 1993. Local site stability has been monitored regularly using a high-precision network.

## 2. Site Improvements

In March, extensive brush clearing of the power line path was completed. Though not impervious to power failures, the cleared line was more robust against outages due to minor storms.

## 3. General Specifications

- Latitude : N 45° 57' 19.812"
- Longitude : E 281° 55' 37.055"
- Elevation : 260.42m
- Reflector : 46m diameter with first 36.6m made of 0.634cm steel plates surrounded by 4.6m of steel mesh.
- Foci : S and X band at prime focus. Gregorian capability with 3m elliptical subreflector.
- Focal length : 18.3m (prime focus)
- Focal ratio : f/D = 0.4 for full surface and 0.5 for solid surface.
- Surface accuracy : 0.32cm for solid portion and 0.64 for mesh.
- Beamwidth : 3.0 arcmin at 3cm wavelength (10GHz)
- Azimuth speed : 20 degrees per minute
- Elevation speed : 5 degrees per minute
- Receiver : S and X cryogenic receiver.
- VLBI equipment : VLBA4 with thin tape drive and Mark 5 Disk recorder. S2 DAS and RT.
- PCFS version : 9.7.7
- Time standard : NR Maser
- GPS receiver : BenchMark
- Timing receiver : CNS clock

## 4. Algonquin Operations

In August, ARO suffered a major malfunction of the bearing assembly for the azimuth drive. Plans to repair the antenna were not undertaken.

Algonquin Radio Observatory was involved in several International VLBI networks in 2006. Geodetic VLBI activities are summarized below.

## 4.1. Sessions Performed January 1, 2006 - December 31, 2006

| Session Type | Number of Sessions |
|---|---|
| R4 | 27 |
| E3 | 6 |
| R&D | 4 |
| T2 | 2 |
| RVD | 1 |
| Total | 40 |

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