

# Gilmore Creek Geophysical Observatory

*Rich Strand*

## Abstract

The following report provides a general technical description and operational overview of the Gilmore Creek Geophysical Observatory located near Fairbanks, Alaska.



Figure 1. Gilmore Creek Geophysical Observatory's telescope, Fairbanks, Alaska.

## 1. GCGO at Fairbanks

Gilmore Creek Geophysical Observatory (GCGO) is located 22 km northeast of Fairbanks, Alaska. The observatory is co-located with the NOAA weather satellite command and data acquisition station. The station sits on an 8,500 acre reservation that is mostly undeveloped wilderness. Ten antennas are in operation. GCGO was instrumented by NASA's Crustal Dynamics Project in the mid 80's for the Alaskan mobile VLBI campaign and used as the base station for those geodetic measurements [1]. The GCGO is part of the NASA Space Geodesy program in cooperation with the U.S. Naval Observatory.

## 2. Technical Parameters of GCGO

The 26 meter telescope, monument number 4047, X-East Y-North, latitude N 64° 58' 43.81288" and longitude E 147° 29' 42.18552" height 306.418 meters is hydraulic-operated and controlled

by a Modcomp computer system (see table 2). The DAT rack is a VLBA terminal and recorder (thin tape). The X/S band microwave receiver has a cryogenic low noise front end. VLBI Field System version 9.5.1 is used with a PC. Hydrogen Maser NR 5 is the time standard with an HP Cesium for the telescope computer. A CNS (TAC) receiver is monitored by the TAC32 software for GPS offset measurements. The station also runs two NASA/JPL Rogue receivers 8100 running JPL VO5 scintillation software. The Institut Geographique National in France operates a DORIS beacon located near the NOAA VHF transmitter building. Nortel Data Network Systems operates for the German Space Agency the PRARE (Precise Range and Range Rate Equipment). CLS from France operates the ARGOS beacon and have installed their new system, ARGOS-NEXT on site.

Table 1. Address of GCGO near Fairbanks.

Gilmore Creek Geophysical Observatory  
 NOAA/NESDIS FCDAS  
 1300 Eisele Road  
 Fairbanks, AK 99712  
<http://www.fcdas.noaa.gov>

Table 2. Technical parameters of the GCGO radio telescope for geodetic VLBI.

Parameter	GCGO
owner and operating agency	NOAA/NASA
year of construction	1962
receiving feed	primary focus
diameter of main reflector	26 meters
focal length	10.9728 meters
surface accuracy of reflector	889 mm rms
X Y mount	1 degree per second
S-band	2.2 – 2.4, <i>GHz</i>
$T_{sys}$	62 <i>K</i>
$SEFD(CASA)$	650 <i>Jy</i>
$G/T$	35.3 <i>dB/K</i>
X-band	8.1 – 8.9, <i>GHz</i>
$T_{sys}$	58 <i>K</i>
$SEFD(CASA)$	550 <i>Jy</i>
$G/T$	44.5 <i>dB/K</i>

### 3. Staff of the Gilmore Creek Facility, Fairbanks, Alaska

GCGO is co-located with the NOAA data acquisition facility. The NOAA Manager is Jim Budd. The site is operated by the Lockheed Technology Services Group with Janine Jarvis as Lockheed Project Manager and Roger Kermes, Lockheed Operational Manager. R. Strand and S. Caskey are assigned to GCGO technical staff with T. Knuutila, Z. Padilla, and others assisting. The

telescope's hydraulic system is maintained by M. Meindl, A. Sanders and F. Holan. Day by day scheduling is done by NVI, Cindy Thomas and VLBI technical directives/contract modifications by NASA/GSFC, Bill Wildes.

#### 4. Status of Gilmore Creek Geophysical Observatory

GCGO scheduled 103 observing sessions for 2001 and completed 86, see section six. Jerry Brown from AMES was on site in January to install a new internet router. Ed Himwich, NVI, was on site that month for Field System, hardware upgrades and station geodetic VLBI operations checkout. Some observing problems that were repaired during the year were a bad combiner hardline cable in the receiver, bad communication cable to the DAT rack and short haul modems, which were replaced with a new version for lightning protection. The dewar's cryogenic compressor was replaced in April and the dewar in July. The PRARE was installed 28th of May with several repairs after that including a motor change. Irv Deigel, Honeywell, was on site 26 July for a major maser overhaul. Bill Wildes, NASA, made a station visit, also in July, for contract mods and observed the dewar replacement.

Table 3. VLBI observing at Gilmore Creek in 2001

Year 2001 Experiments assigned to GCGO - 103
Observations scheduled - 30093
Observations recorded - 25092
Efficiency - 83.38%



Figure 2. GCGO staff removing the receiver for dewar replacement

## 5. Outlook

GCGO will be observing nine sessions per month average with 107 scheduled for year 2002. A MRK-5A installation is possible.

## 6. October X axis Hydraulic Failure, GCGO

During the end of September telescope tracking in the X axis started to decline in performance with bad surging in motion while being driven East. The telescope was taken out of service for a complete hydraulic replacement and overhaul missing 17 sessions from Oct 3 through Nov 20. The X-axis hydraulic drive supplies the power to move the telescope by converting hydraulic power to mechanical power with hydraulic motors. The overhaul required replacement and repair of two motors and the main pump plus additional components such as pressure pumps, filters, valves, and switches. The servo valve and yoke were also replaced as well as control cables remade. Excellent tracking resumed 28 November with CORE-3038.



Figure 3. X axis hydraulic system

## References

- [1] C.Ma, J.Sauber, L.Bell, T.Clark, D.Gordon, W.Himwich, and J.Ryan, Measurement of Horizontal Motion in Alaska Using VLBI 1990, In: Journal of Geophysical Research, vol 95, No.B13, Pg 21991-22011, December 10, 1990