Kokee Park Geophysical Observatory

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Abstract

This report summarizes the technical parameters and the technical staff of the VLBI system at Kokee Park on the Island of Kauai. Included is an overview of the VLBI activities for the year 2005.

1. KPGO

Kokee Park Geophysical Observatory is located on the Island of Kauai in the Hawaiian Islands; Kauai is the most northwestern (inhabited) Island. The site is in a State Park (Kokee State Park) hence its name. It is located at an elevation of 1100 meters near the Waimea Canyon, which is often referred to as the Grand Canyon of the Pacific.

Kokee Park Geophysical Observatory first participated in VLBI operations as part of the GAPE experiments in 1984. At that time the station was part of NASA's STDN (Satellite Tracking Data Network). The 9-m system was modified by installing a focal point receiver, hydrogen maser, data acquisition terminal, tape drive and computer system. This was operational for the summer of 1984. The system was removed after the GAPE '84 experiments and reinstalled again for the summer of 1985. It was not until 1986 that we became a continuous participant in VLBI operations.

In October 1989 NASA phased out the STDN operation on Kauai and the station was transferred to the Crustal Dynamics Project at the Goddard Space Flight Center. The station started weekly operation for the U.S. Naval Observatory as part of the NAVNET network.

Early in 1992 construction of USNO's present 20-meter antenna was started. The foundation work was completed in August 1992 and the structure was started in September just as Hurricane Iniki struck on September 11, 1992. Installation was completed in 1993 and first light was in June 1993. Later in 1993 the use of the 9-meter system was discontinued.

Starting in July 2000 Kokee Park began daily (Monday through Friday) participation in the Intensive schedule for USNO.

S-2 recorder system was installed in 2000. Mark IV system was installed during 2001.

In May of 2002 Mario Bérubé and Bill Petrachenko arrived on site for installation and testing of a S-2 DAS. We have since that time supported the E-3 series of experiments on a monthly basis.

In May of 2002 Kokee Park received a Mark 5 system which was first run in parallel with the tape drive during the daily Intensive sessions (three times a week). Correlation was first done at Haystack; after several weeks of comparison we then started to ship the disk to USNO. During CONT02 the Mark 5 was used in stand alone mode. Switching between Intensive sessions and other experiments became a pleasure.

During November 2002 the survey team was on station to verify our antenna footprint and to survey the new (replacement) Doris beacon antenna.

A new MET package (MET3) was installed in February 2003.

Mid 2004 we started having problems with our Azimuth Gear Reducers. One was removed and shipped back to the manufacturer for refurbishment (this was found to be too expensive), and an additional unit was procured. The new Gear Reducer was finally received and installed in time for CONT05.

New F.S. Computer was installed in 2005

Figure 1. Kokee Park Geophysical Observatory 9m & 20m antennas.

Table 1. Location and Addresses of Kokee Park Geophysical Observatory

Longitude	159.665° W
Latitude	22.126° N
Kokee Park Geophysical Observatory P.O. Box 538 Waimea, Hawaii 96796 USA	

2. Technical Parameters of the VLBI System at KPGO

The receiver is of NRAO (Green Bank) design (dual polarization feed using cooled 15 K HEMT amplifiers). The DAR rack and tape drive were supplied through Green Bank. The antenna is of the same design and manufacture as those used at Green Bank and Ny-Ålesund.

The technical parameters of the radio telescope are summarized in Table 2.

Timing and frequency is provided by a Sigma Tau Maser with a NASA NR Maser providing backup. Monitoring of the station frequency standard performance is provided by a CNS (GPS) Receiver/Computer system. The Sigma Tau performance is also monitored via the IGS Network.

3. Technical Staff of the VLBI System at KPGO

The staff at Kokee Park during calendar year 2005 consisted of six people who are employed by Honeywell under contract to NASA for the operations and maintenance of the Observatory. Staffing will be reduced in 2006 due to budget reductions. VLBI operations were conducted by Kelly Kim, Matt Harms, and Kawika Fujita.

Table 2. Technical parameters of the radio telescope at KPGO.

Parameter	Kokee Park
owner and operating agency	USNO-NASA
year of construction	1993
radio telescope system	Az-El
receiving feed	primary focus
diameter of main reflector d	$20m$
focal length f	$8.58m$
f/d	0.43
surface contour of reflector	$0.020 inches rms$
azimuth range	$0 \ldots 540^\circ$
azimuth velocity	$2^\circ/s$
azimuth acceleration	$1^\circ/s^2$
elevation range	$0 \ldots 90^\circ$
elevation velocity	$2^\circ/s$
elevation acceleration	$1^\circ/s^2$
X-band (reference $\nu = 8.4GHz, \lambda = 0.0357m$)	$8.1 - 8.9\,GHz$
T_{sys}	$40\,K$
$S_{SEFD}(CASA)$	$900\,Jy$
G/T	$45.05\,dB/K$
η	0.406
S-band (reference $\nu = 2.3GHz, \lambda = 0.1304m$)	$2.2 - 2.4GHz$
T_{sys}	$40\,K$
$S_{SEFD}(CASA)$	$665\,Jy$
G/T	$35.15\,dB/K$
η	0.539
VLBI terminal type	VLBA/VLBA4-Mark 5
Field System version	9.7.6

4. Status of KPGO

Kokee Park has participated in many VLBI experiments since 1984. We started observing with GAPE, continued with NEOS and CORE, and are now in IVS R4 and R1. We also participate in the RDV experiments.

We averaged 1.5 experiments per week during calendar year 2000 and increased to an average of 2 experiments of 24 hours each week with daily Intensive experiments during year 2002 and into 2005.

Kokee Park also hosts other geodetic measurement systems, including PRARE, a DORIS beacon, and a Turbo-Rogue GPS receiver. Kokee Park is an IGS station.

5. Outlook

e-VLBI was expected to make its debut during the first part of 2003. However, we are delayed due to the common "last mile" problem in 2004 and budget reductions in 2005.

Upgrading of our SX receiver and its interface drawer has been put on hold for the time being.

Figure 2. Kokee Park also hosts other systems; DORIS Beacon, PRARE, and IGS (GPS).