

# Kokee Park Geophysical Observatory

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## Abstract

This report summarizes the technical parameters and the staff of the VLBI system at Kokee Park on the Island of Kauai.

## 1. KPGO

Kokee Park Geophysical Observatory (KPGO) is located in the Kokee State Park on the island of Kauai in Hawaii at an elevation of 1100 meters near the Waimea Canyon, often referred to as the Grand Canyon of the Pacific.



Figure 1. KPGO 20m antenna and operations building.

## 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. We presently employ a Mark 5A recorder for all of our data recording.

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.

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	

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	0.020inchesrms
azimuth range	0...540°
azimuth velocity	2°/s
azimuth acceleration	1°/s <sup>2</sup>
elevation range	0...90°
elevation velocity	2°/s
elevation acceleration	1°/s <sup>2</sup>
X-band (reference $\nu = 8.4GHz, \lambda = 0.0357m$ )	8.1 – 8.9GHz
$T_{sys}$	40 K
$S_{SEFD}(CASA)$	900 Jy
$G/T$	45.05 dB/K
$\eta$	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
$\eta$	0.539
VLBI terminal type	VLBA/VLBA4-Mark 5
Field System version	9.7.6

### 3. Staff of the VLBI System at KPGO

The staff at Kokee Park during calendar year 2007 consisted of five people who are employed by Honeywell International under contract to NASA for the operations and maintenance of the

Observatory. VLBI operations and maintenance was conducted by Matt Harms, Chris Coughlin and Kelly Kim. Ben Domingo does antenna maintenance with Amorita Apilado providing administrative, logistical and numerous other support functions.



Figure 2. KPGO Maintenance Day.

#### 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 2007.

Kokee Park also hosts other systems, including a 7m PEACESAT command and receive antenna, a DORIS beacon, and a Turbo-Rogue GPS receiver. Kokee Park is an IGS station.

Canadian S2 support ended late in 2006 due to Canadian government budget cuts leading to the demise of their program. Also in 2006, PRARE support ended when the equipment became no longer supportable due to lack of spares. We will miss both of these projects and wish those we've met working on these programs the very best in the future.

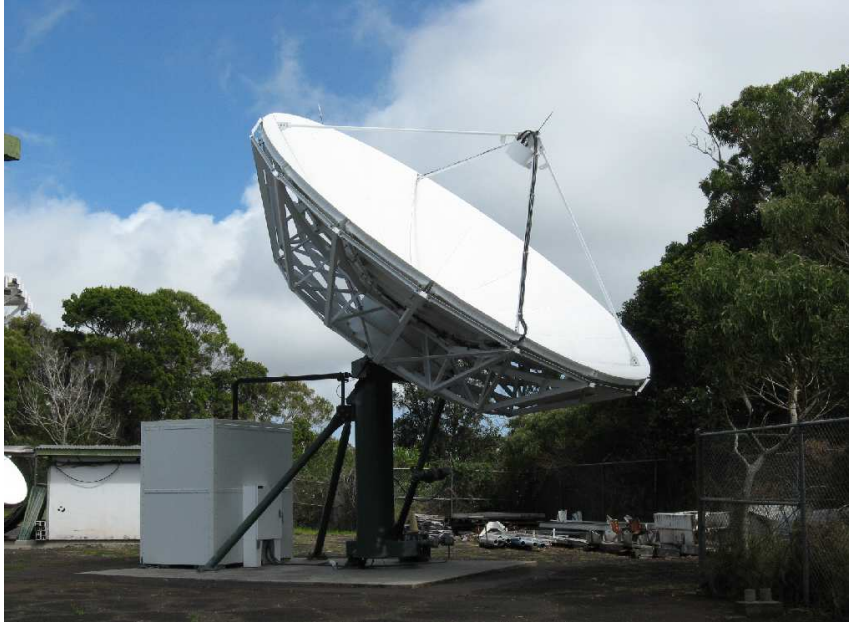


Figure 3. PEACESAT 7m Antenna.

In 2006, use of the tape recorder ceased, and we now use the Mark 5 for all VLBI supports with the exception of the Australian S2 supports, which run on their own system using VHS tapes.

Late in 2006, we had problems with our primary (SigTau) maser, and we have been using our backup (NASA NR-1) maser as our primary while awaiting parts to be procured for the SigTau repair.

In mid-2007, we filled the staff vacancy to bring our manpower level back to 100%.

Representatives from the Carnegie Institute removed a seismic station that was installed a few years earlier due to the end of the need to gather data at our location.

In October of 2007, Japanese interests, along with representatives from NASA, USNO and the State Department, held a meeting at KPGO to explore the possible installation of a project called QZSS. In December, they announced that the first phase of the joint project would begin construction in the spring of 2008.

## 5. Outlook

We are closer to providing real time e-VLBI, and testing for system performance and data transmission evaluation is being discussed for late 2008. Steps have been taken to secure a wide band pipe needed for this support.

The QZSS project will begin installation of its equipment in 2008 and is looking at an early 2010 timeframe for reaching full operational capability.

We are supposed to participate in the CONT08 series of experiments later this year.

NASA plans to upgrade aging building infrastructure and will be investigating options to bring about the much needed repairs.