

# Washington Correlator

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## Abstract

This report summarizes the activities of the Washington Correlator for 2012. The Washington Correlator provides up to 80 hours of attended processing per week plus up to 40 hours of unattended operation, primarily supporting Earth Orientation and astrometric observations. In 2012, the major programs supported include the IVS-R4, IVS-INT, APSG, and CRF observing sessions.

## 1. Introduction

The Washington Correlator (WACO) is located at and staffed by the U.S. Naval Observatory (USNO) in Washington, DC, USA. The correlator is sponsored and funded by the National Earth Orientation Service (NEOS), which is a joint effort of the USNO and NASA. Dedicated to processing geodetic and astrometric VLBI observations, the facility spent 100 percent of its time on these sessions. The weekly IVS-R4 sessions, the IVS-INT01 Intensives, the Asian-Pacific space geodynamics (APSG), the Australian AuScope (AUST), and the Celestial Reference Frame (CRF) sessions were processed at WACO. The facility houses a Mark IV correlator and the new DiFX correlator.

## 2. Correlator Operations

- The Washington Correlator continues to operate 80 hours per week with an operator on duty. The correlator has continued to function well unattended, allowing another 40 hours per week, on average, of extra processing. This has also decreased the time it takes to process an R4 or other 24-hour session by one day, hence the latency in the data being fully processed and available by one day.
- The correlator staff continues the testing and repair of Mark 5 modules. Not only were failed disks replaced, but some modules were upgraded by the replacement of lower capacity disks with higher capacity disks.
- Intensive observations from Kokee Park and Wettzell were routinely transferred via high speed data networks (e-VLBI) during 2012. 24-hour sessions from both Hobart antennas, Katherine, Yarragadee, Warkworth, Ny-Ålesund, Fortaleza, Yebes, Noto, HartRAO, Tsukuba, Aira, Kashima, Chichijima, and Sintotu were also transferred by high-speed data networks.
- Table 1 lists the experiments processed during 2012.

## 3. Software Correlator

In September 2012, Phase I of the new DiFX software correlator was delivered by the National Radio Astronomy Observatory (NRAO) to the USNO. This Phase I implementation consists of 33 compute nodes with 16 processor cores per node for a total of 528 cores. The compute nodes are

Table 1. Experiments processed during 2012.

52	IVS-R4
16	CRF
3	APSG
3	AUST
230	Intensives

connected via 10 Gbps Ethernet over fiber. Cluster management is performed via two infrastructure servers that are connected to the diskless compute nodes. The new implementation runs the DiFX software package along with the USNO implementation of the graphical user interface (GUI).

Since delivery, USNO personnel have been involved in the configuration and testing of the new correlator. Successful processing of VLBI data from the VLBA and the IVS has been performed. Data have been streamed from the two connected Mark 5C units, as well as directly from the connected storage area network (SAN). Correlated data have been successfully passed through the entire geodetic reduction path from correlation to fringing via the Haystack Observatory Postprocessing System (HOPS) package to database generation and analysis via Calc/Solve.

#### 4. Staff

The Washington Correlator is under the management and scientific direction of the Earth Orientation Department of the U.S. Naval Observatory. Due to a change in policy by the U.S. Navy, the NVI support contract was ended. At the beginning of 2012 the VLBI division had filled only three positions, Dr. Kerry Kingham, Mr. David Hall, and Ms. Roxanne Innis. Bruce Thornton was hired in February, and in May Mr. Daniel Veillette joined the VLBI division. Dr. Kerry Kingham retired at the beginning of June, and Ms. Maria Davis was hired later that month. Table 2 lists staff and their duties.

Table 2. Staff.

USNO Staff	Duties
Dr. Kerry Kingham	Chief VLBI Operations Division and Correlator Project Scientist
David Hall	VLBI Correlator Project Manager
Daniel Veillette	Astronomer
Bruce Thornton	Lead Physical Science Technician
Roxanne Inniss	Media Librarian
Maria Davis	Physical Science Technician

## 5. Outlook

During 2013, the processing load should be transferred from the present Mark IV hardware correlator to a DiFX software correlator.