

Healy 2011 UHDAS installation

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Revision History

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1 Introduction

USCGC Healy has two Doppler current profilers made by Teledyne RDI. These instruments are used to calculate ocean currents beneath the ship. Historically, data acquisition was performed by the manufacturer's software, "VmDAS". On the 2010 Healy transit HLY10TC from Honolulu to Dutch Harbor, a new system, "UHDAS", was installed for ADCP data acquisition and processing. The computer's operating system was upgraded before the 2011 Seattle-San Francisco shakedown cruise (HLY10TA) and the UHDAS software was upgraded to a Matlab-free version. This is the standard for UHDAS on seagoing installations. This document describes UHDAS and the installation of the system on the Healy as of May, 2011.

2 Healy UHDAS Installation

2.1 ADCPs

2.1.1 History

The Healy was delivered with two Broadband ADCPs, a 300kHz and 150kHz. The 300kHz

instrument never really worked, and in 2002, it was replaced with 75kHz phased array “Ocean Surveyor” ADCP.

2.1.2 2010 Field Season

During the winter in-port period of 2010, the 150kHz Broadband ADCP was replaced with a 150kHz phased array “Ocean Surveyor” (loaned by Univ Alaska, Fairbanks). These are referred to as OS75 and OS150, respectively. Also during the in-port period, a new cableway was built from the transducer void to the Potable water room. The OS150 cable was routed through that new cableway in an attempt to reduce electrical noise.

During the cruise HLY10TC, serial transmission errors between the UHDAS computer and the ADCP deck units prompted two actions: (1) rewriting the binary serial acquisition routine to be more robust against gaps in transmission (2) replacing the RS232 serial run with fiberoptic cable. No serial errors were seen in the ADCP data after this improvement.

2.1.3 2011 Field Season

Prior to the 2011 season, the deck units were temporarily relocated to a set of shelves in the aft, port corner of the MICA room. This was done in an effort to reduce electrical noise in the transducer cables, which has historically lead to severe biases in the broadband mode and drastically compromised range. The transducer cables were pulled, connectors intact, and reattached to the deck units in their new location. Temporary fiber (serial communications), power (for two dual-conversion UPSs (from the Polar Sea?)), and synchro feeds were also run. It is recommended that the installation remain “as is” through the 2011 field season.

2.2 Computer

Historically, ADCP acquisition and processing have used the software provided by the manufacturer (“VmDAS”). This software acquires data from the ADCP and other serial feeds (GPS and attitude), timestamps the serial data and it saves to disk. It also adds UTC time and GPS positions to each ADCP ensemble, and transforms the ADCP beam velocities into horizontal velocities referenced to earth. The software includes averaging and display of various variables. Each ADCP requires one Windows machine running VmDAS. In addition to the ADCP, each computer needs its own serial feeds of position and attitude.

As of 2011, annual grooms by RDI are not anticipated. Therefore VmDAS-enabled computers will not be maintained. ESU has taken the two VmDAS computers. The settings from these VmDAS computers have been archived. VmDAS is not required to communicate with the ADCPs or to run built-in tests. General serial troubleshooting can be done using the terminal-emulation program `tk_terminal.py`, available on the UHDAS computer.

For the 2010 UHDAS installation, LDEO supplied a Dell R210 server, Digi Neo 8-port PCI serial card (with octocable dongle). This computer contained two 160Gb disks with two bootable Windows partitions and a requirement that 30Gb be reserved for dire emergency (in case this machine needs to be pressed into service to replace some other failed machine, at sea). The two Windows partitions were reserved with the plan that they (a combination of 2 Windows installations and a virtual machine) will replace the two VmDAS computers, thus

consolidating all ADCP operations in one computer. Ubuntu 9.04 (Hardy Heron) was installed and configured to use the Digi, and ran successfully during the entire 2010 season. The 160Gb disk has been removed and is on standby for the 2011 season, after which time it can be repurposed.

For the 2011 season, the UHDAS computer was moved lower in the rack (where the 2 Xserve computers were located) and Ubuntu Lucid Lynx (10.04) was installed. The Digi PCI card does not run with the “jsm” module, but requires a Digi driver (untested for this system). Due to time constraints, a VSCOM 8-port serial-USB device (FTDI chip) was substituted. A spare is stored onboard. A second Dell R210 was configured in Seattle after HLY11TA and will be tested during the HLY11TB transit to Honolulu. If all goes well, this computer will remain the primary UHDAS computer for the 2011 season. The permanent display, mouse, and keyboard reside in the watchstanders' area, using one of the displays that had previously been used for one of the VmDAS computers.

2.3 Serial Ports

UHDAS uses one process per serial port for data acquisition. The input streams are filtered by message, timestamped, and written to a directory named after the instrument being logged. More than one NMEA string can be acquired from a given serial stream. If the rate of repetition is too high, messages may be subsampled prior to recording. The file “sensor_cfg.py” contains settings for serial acquisition, including ports, baud rates, and message strings. (NOTE that indentation must be respected when editing sensor_cfg.py, as it is written in Python). CODAS processing requires position and heading. We try to log all required input types from multiple sources, to allow for reprocessing (in case of gaps or failure in the primary serial feed).

Serial messages logged during 2010 and 2011 seasons are:

Serial directory	instrument	suffix	messages
ashpaq5	Ashtech adu5	paq	\$GPGGA,\$GPPAT
gpsnav	Pcode gps	gps	\$GPGGA
gyro	Sperry mk39	hdg	\$INHDT
gyro2	Sperry mk27	hdg	\$HEHDT
os150	RDI adcp (150kHz)	raw, log, log.bin	(binary adcp data + log files)
os75	RDI adcp (75kHz)	raw, log, log.bin	(binary adcp data + log files)
posmv	POSMV	pmv	\$PASHR,\$INGGA

Serial acquisition layout is diagrammed in the Appendix.

UHDAS and CODAS settings

2.3.1 UHDAS settings for ADCPs

The UHDAS gui starts with defaults for ADCP data acquisition. These are:

ADCP	broadband mode	narrowband mode	bottom track
os150	biased: do not use	bin size = 4m 70 bins blank = 5m	use sparingly; not necessary with CODAS processing
os75	bin size = 8m 50 bins blank = 8m	bin size = 16m 50 bins blank = 8m	use sparingly; not necessary with CODAS processing

2.3.2 CODAS processing settings

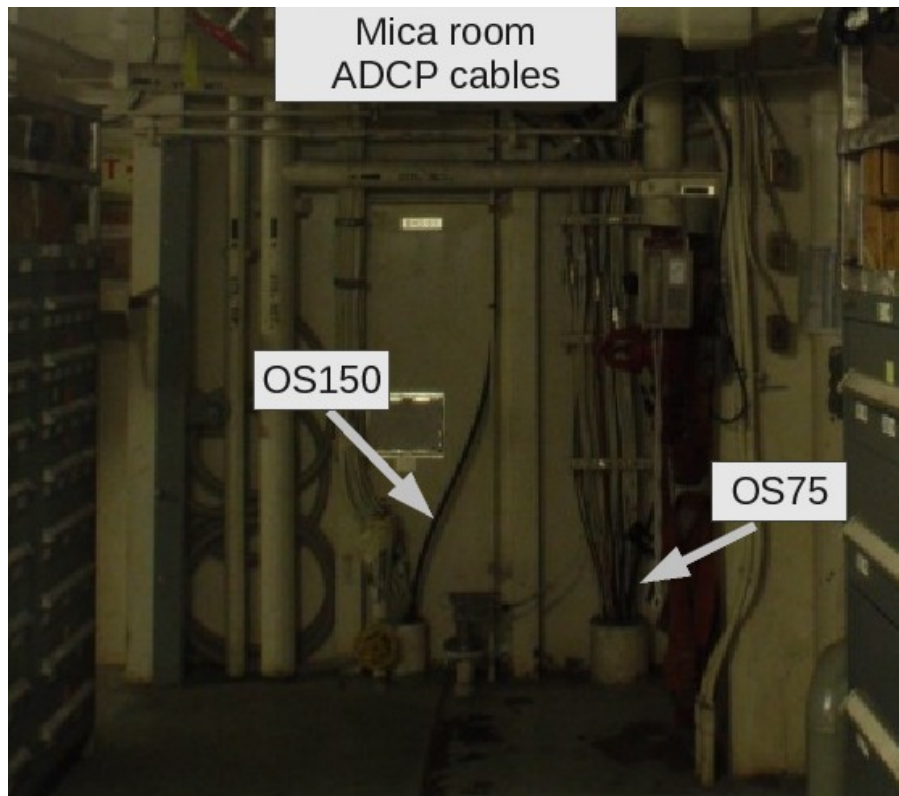
Settings for heading and position source, and transducer angle are:

heading (reliable)	best position	heading correction (accurate)	transducer angle os75	transducer angle os150
posmv \$PASHR	posmv \$GPPGA	(none)	43.4	28.4

If necessary, processing of UHDAS data can be redone at a later date using different supporting serial strings. Reprocessing of UHDAS data on the Healy should be able to use appropriate settings chosen from:

instrument	position/time	reliable heading	accurate heading
Ashtech	\$GPGGA		\$GPPAT
Pcode	\$GPGGA		
POSMV	\$INGGA	\$PASHR	\$PASHR
mk39		\$INHDT	

2.4 ADCP Transducer drawings



Healy ADCP transducer locations

