

UHDAS and CODAS:

Raising the Profile of Ocean Currents

Dr. Julia Hummon, University of Hawaii ● INMARTECH meeting, WHOI, Oct 2018

ADCP:

Part 1

Acoustic Doppler Current Profiler

CODAS:

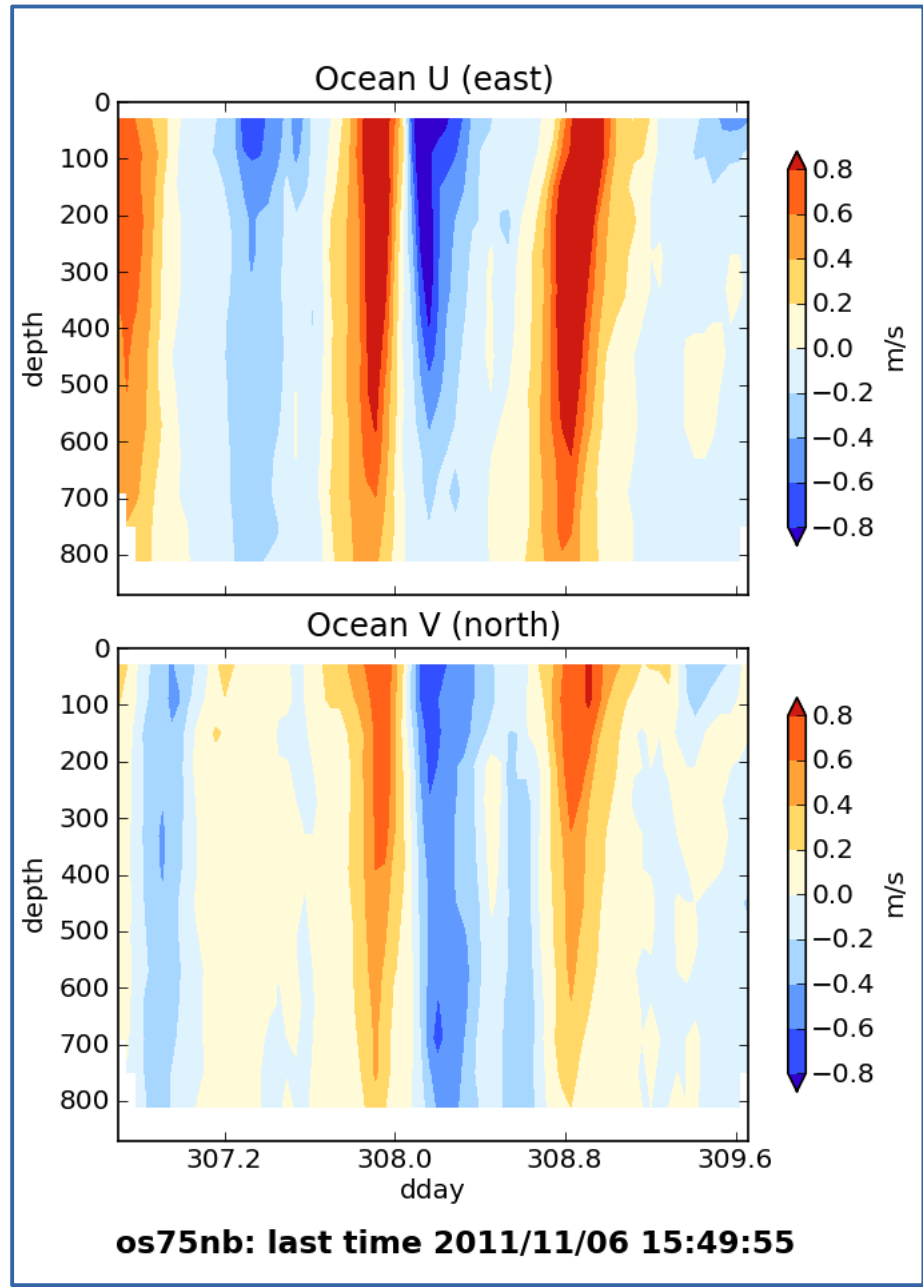
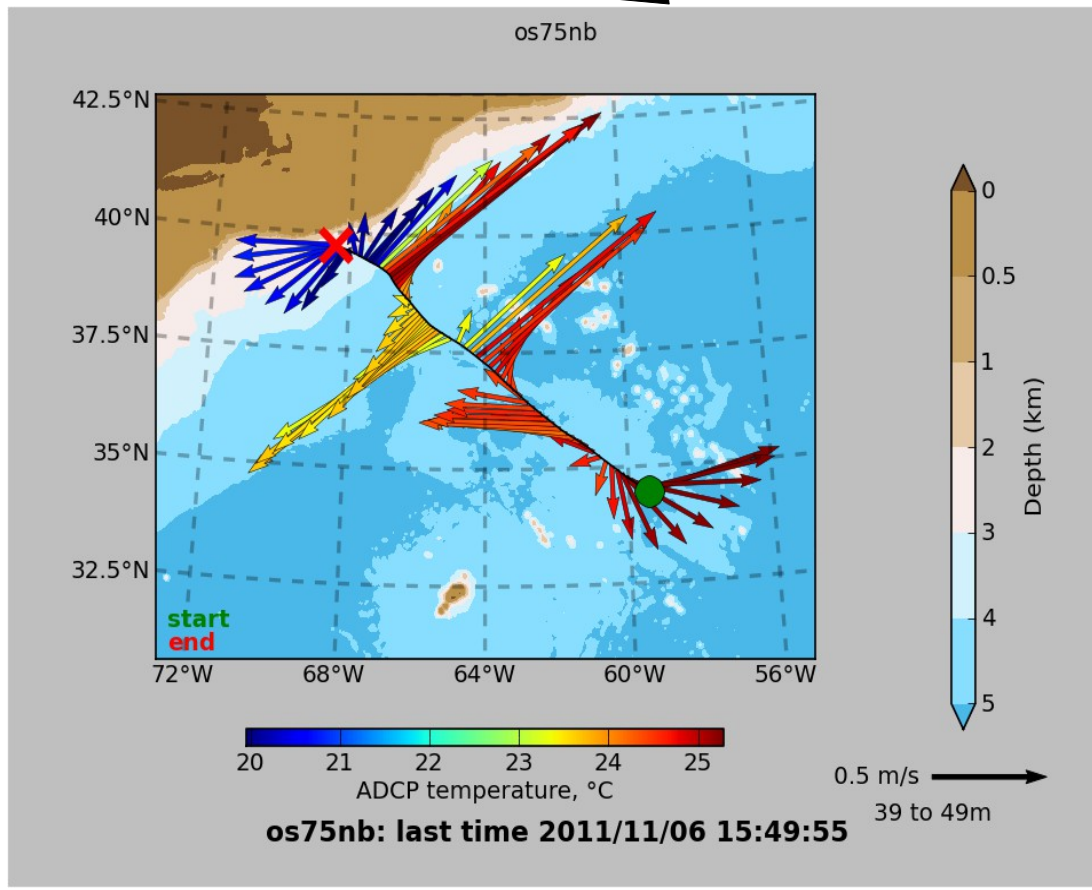
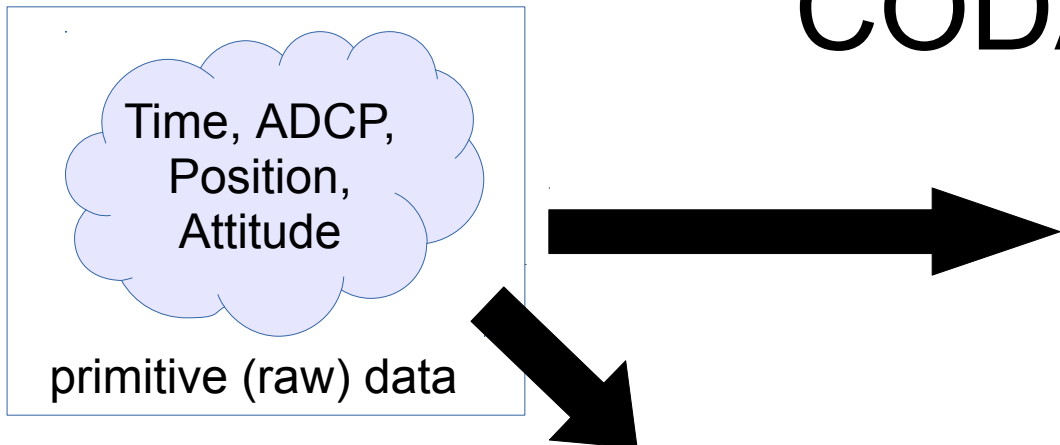
(refers to ADCP processing software)

UHDAS:

Part 2

University of Hawaii Data Acquisition System

CODAS Processing



CODAS processing

CODAS = **C**ommon **O**cean **D**ata **A**ccess **S**ystem

- GOALS:

- science-ready data when finished
- accessible to anyone/many
- improve the usefulness and visibility of ADCP data
- balance: Big Automatic Script



Fine-tune the machinery if problems exist

CODAS preliminary processing: 2 flavors

(1) Preliminary processing **single-ping** data

- beam-to-earth coordinates
- single-ping editing (acoustic interference, bottom)
- create averages; save to disk
- format averages into CODAS database

(2) reformat pre-averaged data into CODAS database

- 1980's PINGDATA
- VmDAS: *.LTA, *.STA

} (no single-ping editing)



Next: “post-processing steps”

CODAS post-processing:

- View figures and logfiles
- Fix heading:
 - patch gappy but accurate heading correction (if relevant)
 - apply time-dependent heading correction
- Determine corrections/calibrations, then apply
 - remaining transducer angle offset
 - scale factor (if relevant)
 - transducer-GPS offset (in meters)
- Manually edit out bad data (dataviewer.py)
 - use thresholds for bulk editing
 - graphically select bins or profiles; use Seabed Selector for bottom
- check calibrations
- make figures ([web page](#)) export data (matlab, netCDF)

CODAS software tools:

- visualization of **single-ping beam values**
 - RSSI (signal return)
 - beam velocity
 - estimate EA (transducer angle) `EA_estimator.py`
- view **averaged data** (currents, backscatter)
- use plotting programs to help
 - assess quality of heading and position devices
 - plot cruise tracks, make web page with plots
- export netCDF file (all bins, all profiles)

UHDAS and CODAS: Raising the Profile of Ocean Currents

Outline:

ADCP:

Acoustic Doppler Current Profiler

CODAS:

(refers to ADCP processing software)

UHDAS:

Part 2

University of Hawaii Data Acquisition System

UHDAS: What are our goals?

- Enhance the utility and visibility of ADCP data
- Provide viable ocean currents at sea:
 - Data should be useful for science and operations
 - Data should be as close to "final" as possible
(for an automated system)
 - Require minimal post-processing for science
- Reprocessing on multiple operating systems
(Linux, Mac, Windows) – see **CODAS**

What does UHDAS do?

Performs these tasks:

- Data acquisition (TRDI ADCPs)
- Data processing (create ocean currents--**CODAS**)
- Generates data products for science
- Creates tools and components for monitoring
 - monitoring (plots) at sea
 - monitoring (daily email) on shore

UHDAS Components: Acquisition

- runs on linux (Xubuntu 18.04 at present)
- acquisition:
 - communication with ADCPs
 - serial acquisition with timestamps
- reliable, robust, duplicate feeds
 - multiple GPS feeds
 - one computer, multiple ADCPs
 - reliable heading, and accurate heading
- simple graphical interface for settings/stop/start
 - **Green=Good**, **Red=Rubbish**

UHDAS Components: Processing, Plots, and Data

- incremental single-ping processing:
 - stage averages; display 5-minute profile on web site
- load averages, create vector and contour plots
- other plots (on shipboard web site)
 - bridge plot (knots and direction at “surface)
 - profile of vectors (at various depths)
 - heading correction plot (use accurate heading QC)
 - beam velocities
- data (on shipboard web site)
 - matlab (various), netCDF (and **CODAS** database)

UHDAS Monitoring

At Sea (shipboard website):

- plots for science and bridge
- averaged data for science
- raw data (for uber-user to reprocess at sea)
- [example](#) web site

On Land (daily email):

- daily email with ascii status message
- 100K tarball with data snippet, diagnostic info
- [table](#) of email status

Benefits of UHDAS

Real-time accessible data for

- Science at sea, eg:
 - larval recruitment and dispersion
 - context for other measurements
 - drifters
- Operations
 - ROV deployment
 - CTD wire angle
 - mooring deployment

Benefits of UHDAS

- **Reliable, simple interface** for Techs
- **Remote monitoring** by ADCP guru (via daily email)
 - catch problems early; help get them fixed
- **Long-term usefulness:**
 - at-sea configuration designed to maximize later use and recovery
 - **Open source software**
 - Existing path to NODC (via R2R, for USA/NSF data)
- **Open communication with scientists and techs**

UHDAS+CODAS documentation

- what is **documented**
 - CODAS processing (with tutorials); long history
 - installation of CODAS software
 - including free pre-configured virtual computer
 - UHDAS: at sea (web site, data, plots)
 - UHDAS: for techs – how to run it
- **presentations** only (but not documentation):
 - how UHDAS works
- not documented
 - UHDAS installation (Xubuntu, *.deb, *.tar.gz, CODAS)
 - UHDAS configuration (serial, ntp, mail, processing)

UHDAS Installation Note

UHDAS is not a program, but a complex set of code and system configurations.

UHDAS can be thought of as a specialized linux distribution

Setting up a new UHDAS installation requires Linux system administration skills, an understanding of UHDAS, and detailed knowledge of the particular suite of instruments and network environment on the ship.