UHDAS and CODAS:
Raising the Profile of Ocean Currents

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ADCP: **Part 1**

Acoustic **D**oppler **C**urrent **P**rofiler

CODAS:

(refers to ADCP processing software)

UHDAS: **Part 2**

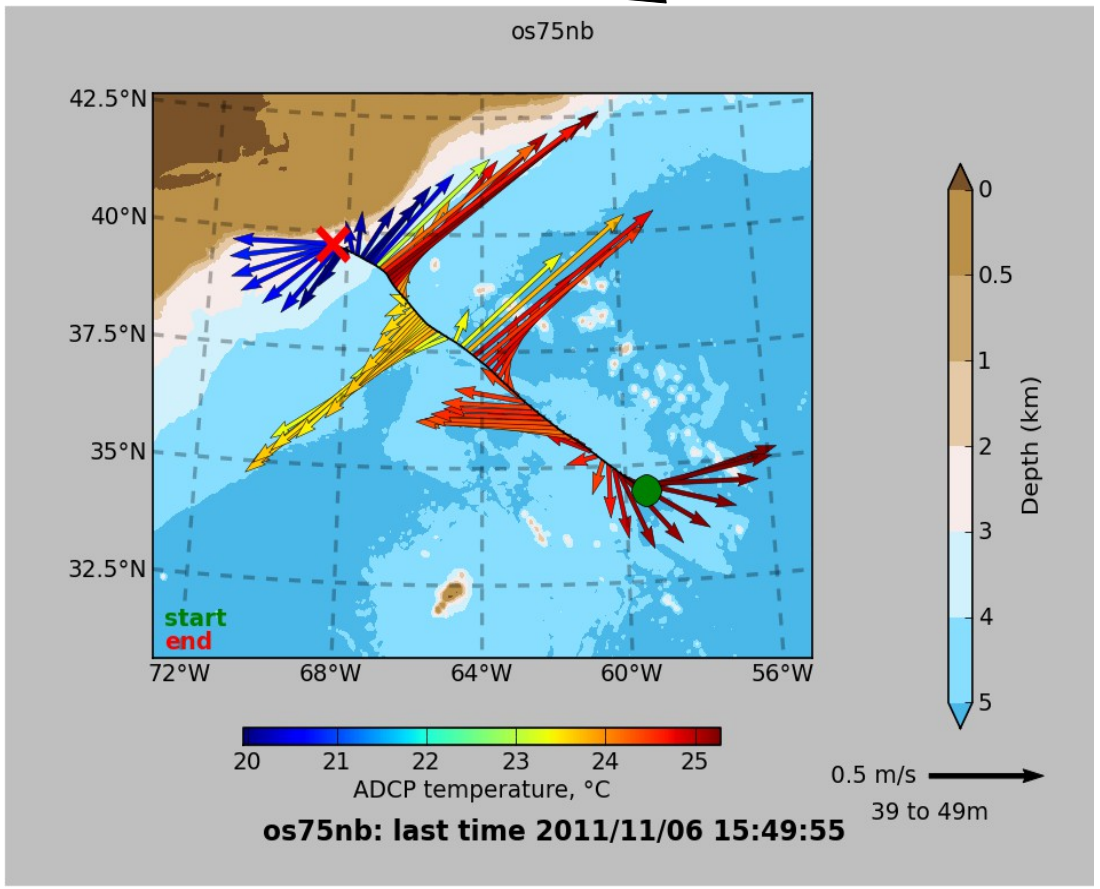
University of **H**awaii **D**ata **A**cquisition **S**ystem

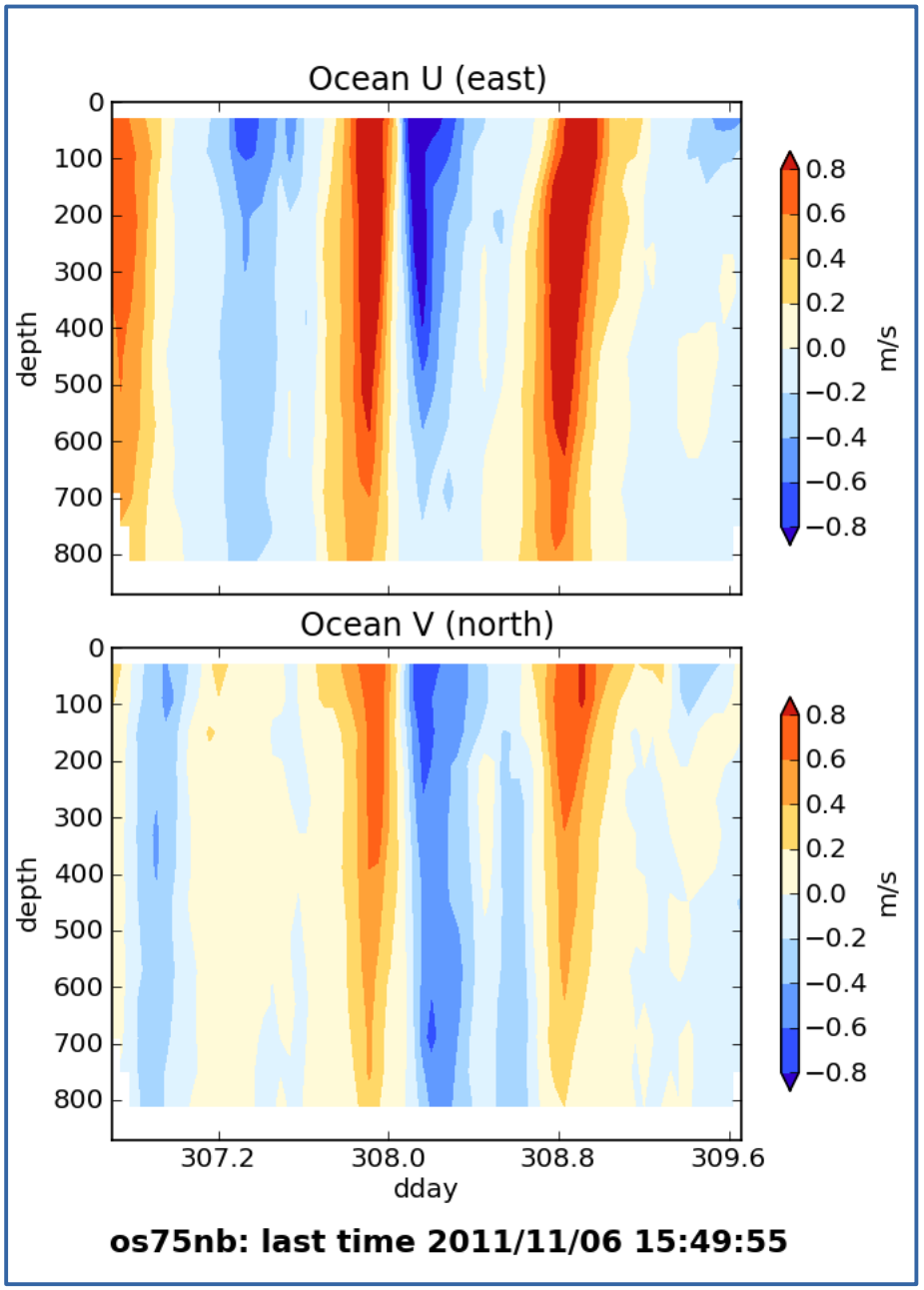
http://uhdas.org

CODAS Processing

Time, ADCP, Position, Attitude

primitive (raw) data





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 **D**oppler **C**urrent **P**rofiler

CODAS:

(refers to ADCP processing software)

UHDAS: **Part 2**

University of **H**awaii **D**ata **A**cquisition **S**ystem

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.