University of Hawaii Data Acquisition System

UHDAS

Raising the profile of shipboard ADCP data
UHDAS Systems Currently Installed (2021)

- Academic Research Fleet:
  - 17 UNOLS ships
  - 3 polar ships
  - NOAA: 11 (+/-)
  - “other” research ships: 6
  - (Volunteer Observing Ships: 2)

78 RDI ADCPs

UHDAS What does it do?

- **Acquisition**: collect GPS, gyro, accurate heading, ADCPs
- **Automated Processing**: at-sea web site
- **Monitoring**: daily email (from UHDAS computer on ship) status page
- **Stewardship**: improve QA, visibility
We also have some science funding to process ADCP data, eg. GOSHIP.
2021: Monitoring and Troubleshooting

For all 40 ships (ARF, NOAA, and other), in 2021:

- **UHDAS automated emails**
  - Over **17,000 UHDAS automated status emails** were viewed in the last year
  - We read ~**6300 emails** from UHDAS computers that were logging data
    - In some cases they were collecting data for POSMV debugging

- **1020 tickets** (communication threads) created for issues on ships including
  - small items: “ADCPs secured for EEZ” (notification)
  - time-consuming: “Hello on the ship, we see a problem...”

- **Remote access to computers**
  - **160 remote logins** (change configuration, update UHDAS code, other change)
Problems with ADCPs

- fouled cables, damaged connectors
- electrical noise (contaminates deep bins)
- temperature spike (indicates likely future failure)
- high temperature variability and loss of range (intermittent)
- cable improperly terminated (beams swapped)
- low signal from one beam (requires repair)
- low signal overall (requires repair)

uncommon
Problems with Ancillary systems

- ABXTWO - **bad antenna** (Sette, Norrona, Healy)
- networked data transmission
  - switches (?) causing gaps and duplicate messages (KM)
  - gyro feed on Endeavor
  - hydrins on Sally Ride coming in twice? (UDP)
- Serial noise due to poor connections
  - Pelican
  - Sette
- Virtual Computer
  - computer time is jumpy
  - vulnerable to network problems
POSMV “thrashing” - gaps in heading and position, errors in heading

GGA times from POSMV

timestamp differences: GGA - UHDAS system

Heading accuracy errors

12.5sec gaps in GGA times

UHDAS system time: first difference

GGA: first difference

accepted if less than 0.020
Effects of POSMV “thrashing” on position and heading

Seapath position - POSMV position

- longitude
- latitude

Seapath heading - POSMV heading

sequential differences of GGA message timestamps
POS MV 12.5 Second Gaps

All ships with POS MV (23)

Blue Heron
Langseth
Walton Smith*
Gunter
James Cook
Discovery
Falkor

Shimada
Lasker
Hassler
Bigelow
Sharp
Revelle

Firmware Patched (8)

POS MV showing 12.5 sec gaps (16)

*WS (POS MV v4)
**TGT (POS MV v5), (POS MV v4-no errors)

2018: first POS MV rumblings

Early 2020: New plots added to UHDAS monitoring: POS MV tracking begins in earnest

April 2021: Darren Billard (Applanix) is fully engaged in analyzing problem

Sept 2021: Applanix produces beta firmware patch as fix

Color Legend:
UNOLS
NOAA
USCG/STARC
Others
RECENT GAPS

RVTEC 2021 - UHDAS ADCP uhdas@hawaii.edu
Improvements in 2021

- **New diagnostic plots** on UHDAS at-sea web site; improved diagnostics in daily email
- **New calibration** number: horizontal offset between ADCP and GPS
- Improved Documentation, including **Best Practices** page
- New: **daily netcdf files** updated near-real-time for cruises requiring frequent data transmission to shore
- Found an ongoing, intermittent problem with POSMV – beta firmware update fixed it?
- Operating systems:
  - **on schedule**, installing the current Long Term Stable Release
  - continue to update operating systems on the ships (remote, FedEx, or visit)
  - touch up UHDAS code when it makes sense (remote)
Coming up in 2022

- start testing Xubuntu 22.04 Summer 2022 (due out April 2022)
  - start upgrading computers to 22.04 maybe fall 2022
- Hire one more person
- Continue documentation improvements, software development

- **New instruments:**
  - test Pinnacle45 (*Neil Armstrong*, Jan 2022, Puerto Rico Trench)
  - further developments with the **EC150 - testing on Sally Ride** (2022)
- CyberSecurity impacts: UCSD forbidding automated email early 2022
- Virtual UHDAS training (operations, for technicians on ships)
- Virtual CODAS training (processing, for scientists using the data)
New Kongsberg instrument

150kHz: EK80 + ADCP = EC150

November 2018:
- Norwegian Fisheries Research ship
  - G.O. Sars
- different raw data format
- EK80 software (modified)
  - compared with OS150
  - serving EC150 via ZMQ
  - triggered: alternate between them
  - UHDAS eavesdropped
  - used CODAS processing

Current: Sally Ride will be testbed
- loaner EC150 from Kongsberg
- loaner OS150 from Blue Heron

Eric Firing is modifying UHDAS to support EC150 communications via EK80 web-based API
Kongsberg is modifying EK80 to have web-based API
Testing sometime in 2022 (long process)