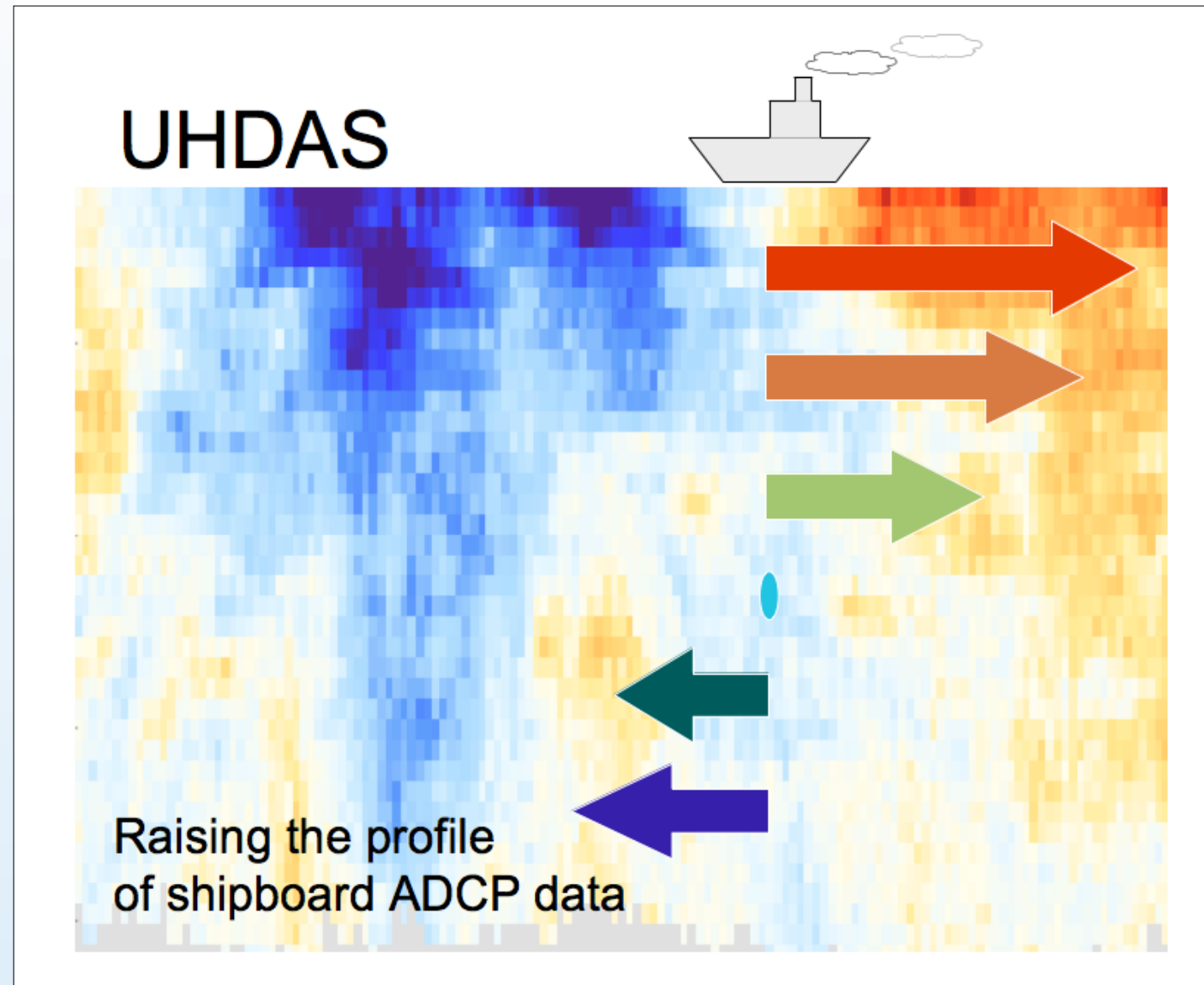


# UNOLS 2021 - UHDAS/ADCP

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Wed Nov 3, 2021

University of  
Hawaii  
Data  
Acquisition  
System



# UHDAS Systems Currently Installed (2021)

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

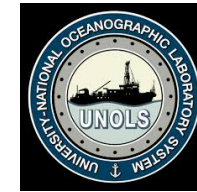
78 RDI ADCPs

## 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



letters	ship name	figures	last email	cruise name	status	daily report	daily email	OS	last update
ae	Atlantic Explorer	<a href="#">figs</a>	12hr	AE2122	logging	<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Feb-28
ar	Neil Armstrong	<a href="#">figs</a>	12hr	ar61a	logging	<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-May-30
at	Atlantis	<a href="#">figs</a>	12hr	(not set)		<a href="#">dir</a>	<a href="#">email</a>	20.04	2021-Oct-18
bh	Blue Heron	<a href="#">figs</a>	20d	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Mar-09
en	Endeavor	<a href="#">figs</a>	5d	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Sep-12
hly	Healy	<a href="#">figs</a>	12hr	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Jun-20
hs	Hugh Sharp	<a href="#">figs</a>	1d 12hr	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-May-30
km	Kilo Moana	<a href="#">figs</a>	12hr	km2116	logging	<a href="#">dir</a>	<a href="#">email</a>	20.04	2021-Sep-12
lg	L.M.Gould	<a href="#">figs</a>	12hr	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Jun-20
mgl	M.G.Langseth	<a href="#">figs</a>	12hr	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Oct-18
np	N.B.Palmer	<a href="#">figs</a>	12hr	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2018-Dec-19
oc	Oceanus	<a href="#">figs</a>	12hr	oc2108a	logging	<a href="#">dir</a>	<a href="#">email</a>	20.04	2021-Mar-20
pe	Pelican	<a href="#">figs</a>	12hr	PE22_13_McHugh_ADCP	(not logging)	<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-May-14
rr	Roger Revelle	<a href="#">figs</a>	13hr	RR2106	(not logging)	<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Mar-09
skq	Sikuliaq	<a href="#">figs</a>	12hr	SKQ202114S	logging	<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Mar-09
sp	R.G.Sproul	<a href="#">figs</a>	6hr	(not set)		<a href="#">dir</a>	<a href="#">email</a>	14.04	2015-Mar-25
sr	Sally Ride	<a href="#">figs</a>	12hr	SR2112	logging	<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Oct-18
sv	Savannah	<a href="#">figs</a>	12hr	SAV-21-24_B_calibrated	logging	<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-May-30
tt	Thomas G. Thompson	<a href="#">figs</a>	12hr	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Oct-18
ws	Walton Smith	<a href="#">figs</a>	12hr	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-Aug-01



- NSF funds the UNOLS ships
- NOAA funds the NOAA ships
- Various institutions or projects fund the “other” ships

#### NOAA ships

letters	ship name	figures	last email	cruise name	status	daily report	daily email	OS	last update
dy	Oscar Dyson	<a href="#">figs</a>	54d	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-May-14
ex	Okeanos Explorer	<a href="#">figs</a>	12hr	EX2107_3	logging	<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Mar-09
fh	Ferdinand Hassler	<a href="#">figs</a>	12d	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-Aug-01
gu	Gordon Gunter	<a href="#">figs</a>	26d	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-May-30
hb	Henry Bigelow	<a href="#">figs</a>	12hr	HB2103_Leg3	(not logging)	<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-Aug-01
nf	Nancy Foster	<a href="#">figs</a>	12hr	NF_Inport_October2021	logging	<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-May-30
pc	Pisces	<a href="#">figs</a>	12hr	PC2107_atpier	logging	<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-Aug-01
rb	Ron Brown	<a href="#">figs</a>	12hr	rb2021-10-26-tomltest	logging	<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Oct-18
rl	Reuben Lasker	<a href="#">figs</a>	12hr	RL21_AutumnRepair	logging	<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-Aug-01
se	Oscar Elton Sette	<a href="#">figs</a>	0hr	se21-11-01-abxtwotest02	logging	<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Jul-13
sh	Bell Shimada	<a href="#">figs</a>	12hr	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-Aug-01



We also have some science funding to process ADCP data, eg. GOSHIP

#### Other UHDAS ships

letters	ship name	figures	last email	cruise name	status	daily report	daily email	OS	last update
fk	Falkor	<a href="#">figs</a>	12hr	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-May-25
inv	Investigator	<a href="#">figs</a>	12hr	inv2021-10-15_test04	logging	<a href="#">dir</a>	<a href="#">email</a>	20.04	2021-Sep-12
kb	Kristine Bonnevie	<a href="#">figs</a>	12hr	KB2021624	logging	<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-Aug-01
nor	Norronea	<a href="#">figs</a>	139d	(not set)		<a href="#">dir</a>	<a href="#">email</a>	16.04	2018-Jul-05
olr	Oleander	<a href="#">figs</a>	4d	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-May-30
ps	Point Sur	<a href="#">figs</a>	12hr	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2020-May-30
ukdy	Discovery	<a href="#">figs</a>	15hr	DY138	logging	<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Jul-13
ukjc	James Cook	<a href="#">figs</a>	66d	(not set)		<a href="#">dir</a>	<a href="#">email</a>	18.04	2021-Jul-13



THE OLEANDER Project

# 2021: Monitoring and Troubleshooting

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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**

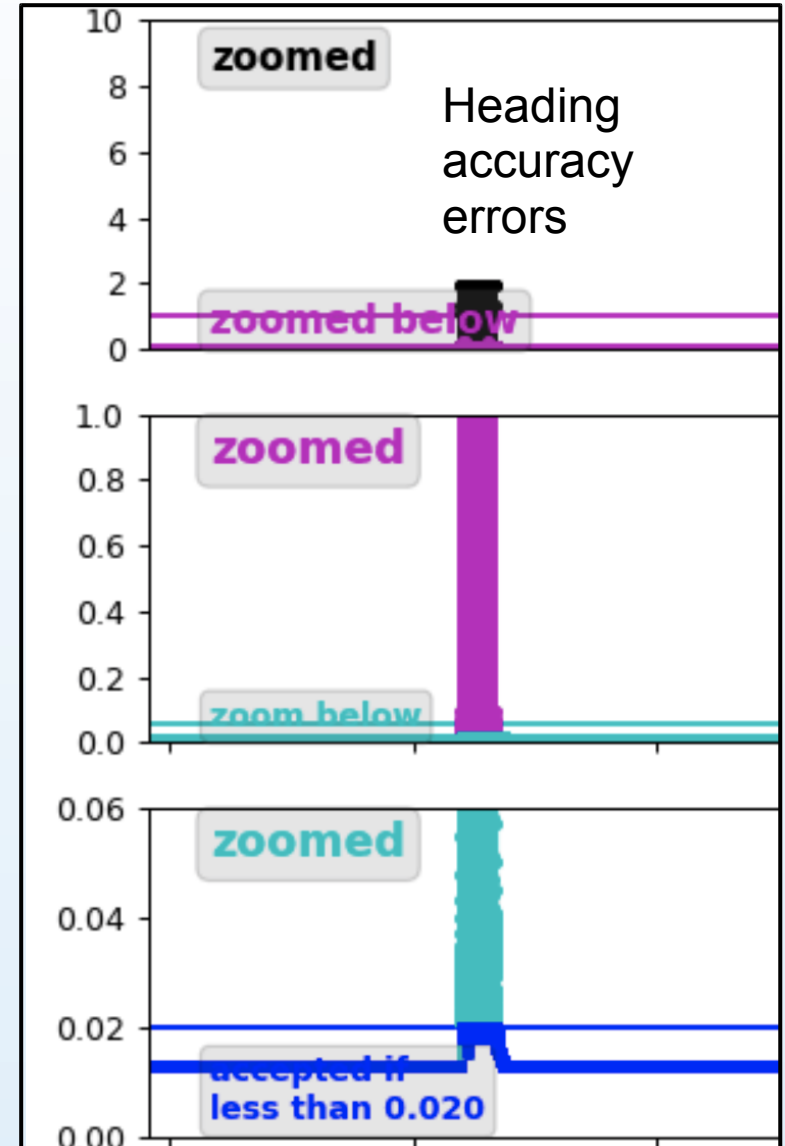
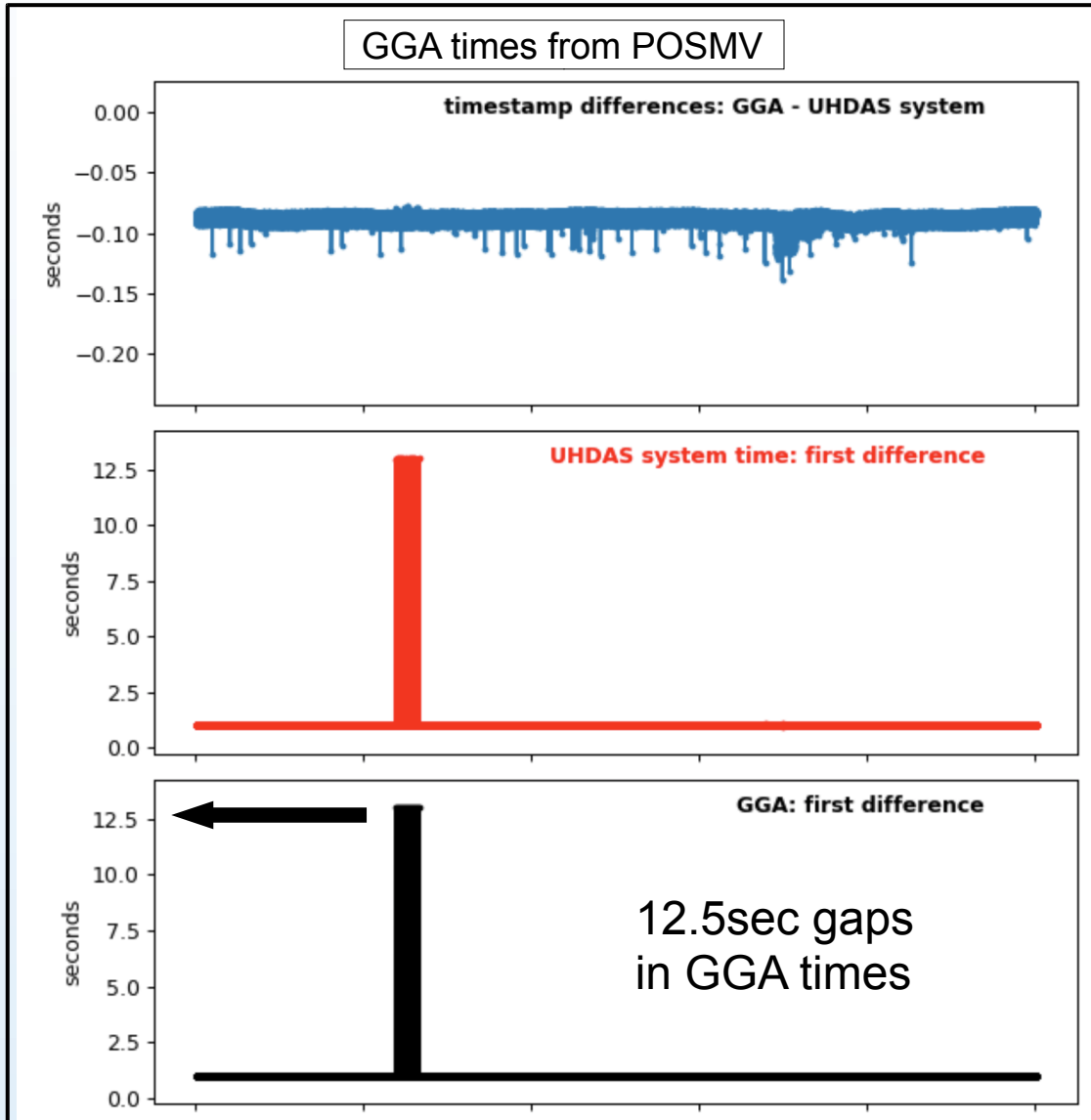


# Problems with Ancillary systems

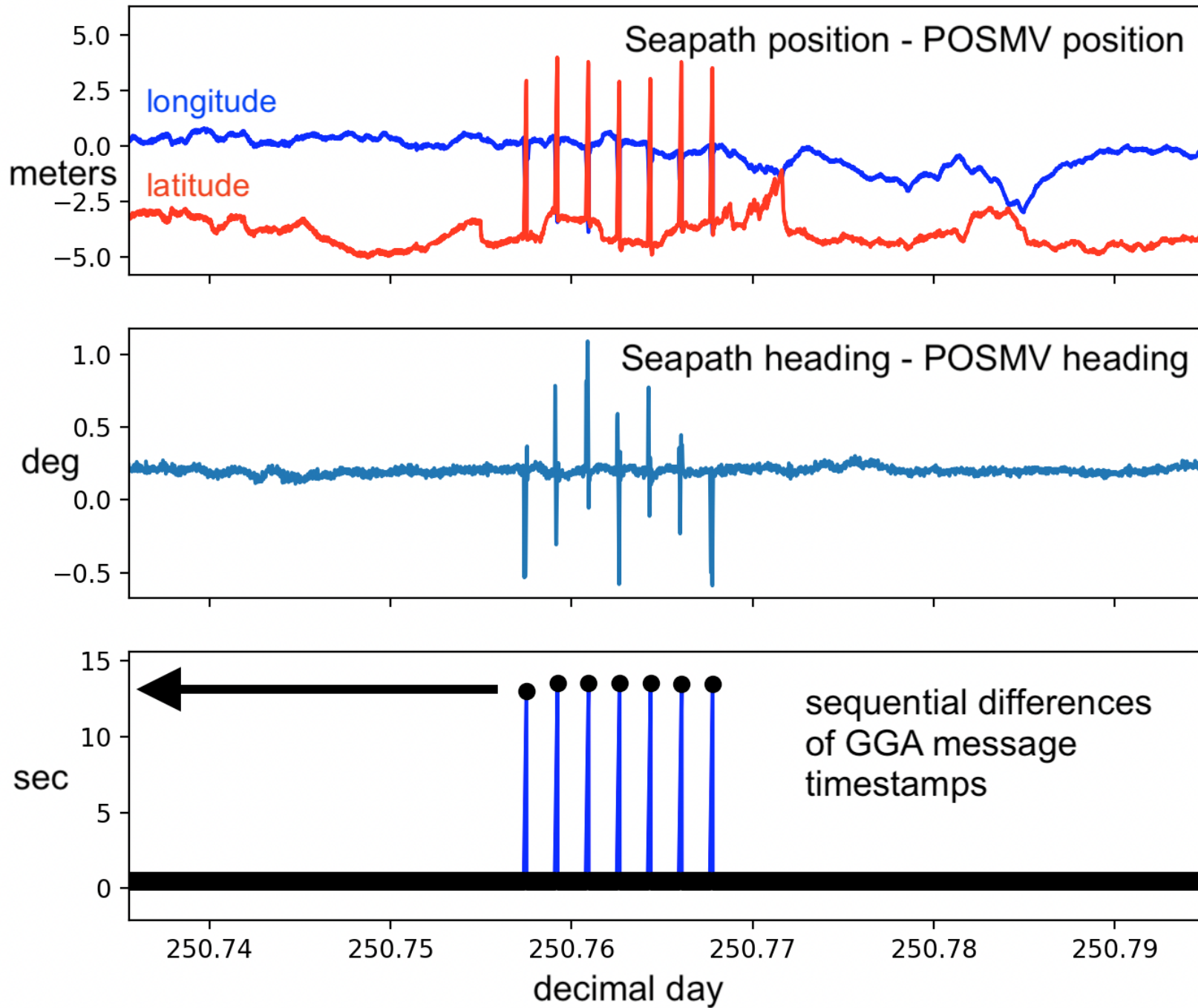
- ABXTWO - **bad antenna** (Sette, Norrona, Healy)
- networked data transmission
  - switches (?) causing gaps and duplicate messages (KM)
  - gyro feed on Endeavor
  - hydrins on Sally Ride coming in twice? (UDP)
- Serial noise due to poor connections
  - Pelican
  - Sette
- Virtual Computer
  - computer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



# POSMV "thrashing" - gaps in heading and position, errors in heading



# Effects of POSMV "thrashing" on position and heading



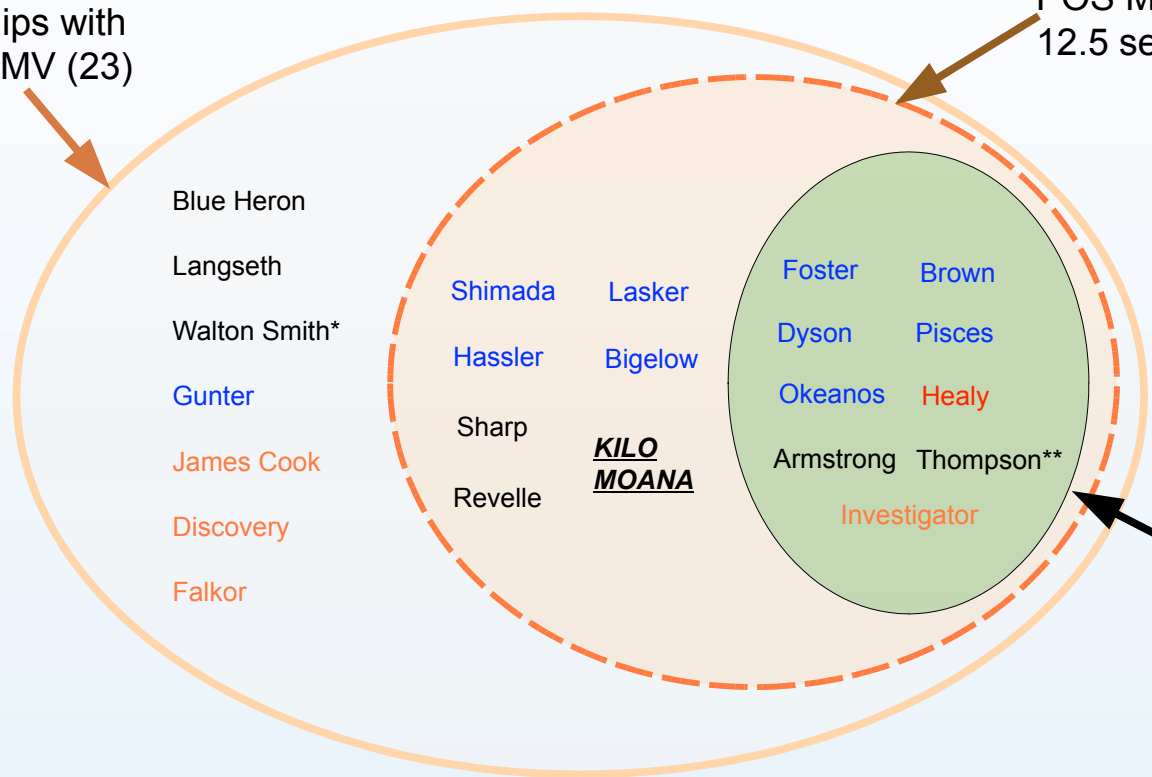


# POS MV 12.5 Second Gaps

Color Legend:  
 UNOLS  
 NOAA  
 USCG/STARC  
 Others  
RECENT GAPS

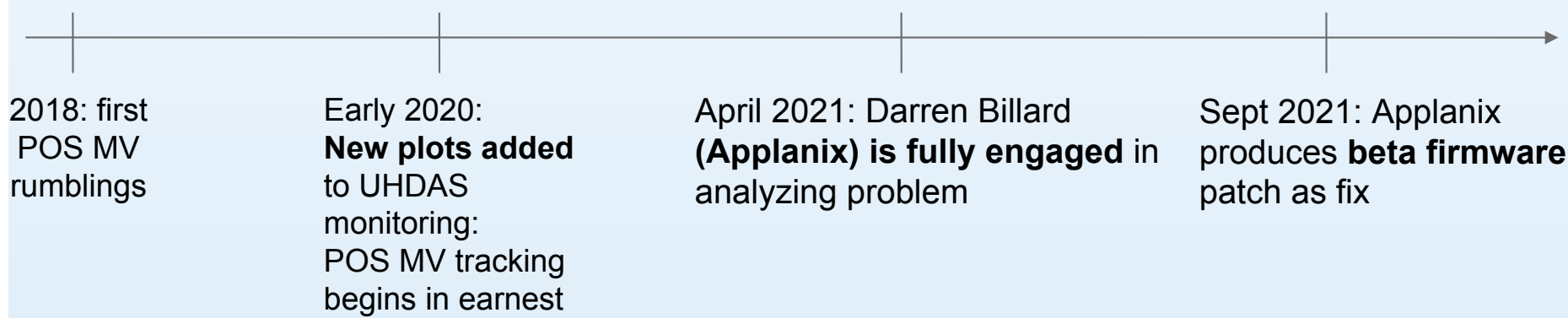
All ships with  
 POS MV (23)

POS MV showing  
 12.5 sec gaps (16)



Firmware  
 Patched (8)

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



# 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)**

