OUTLINE
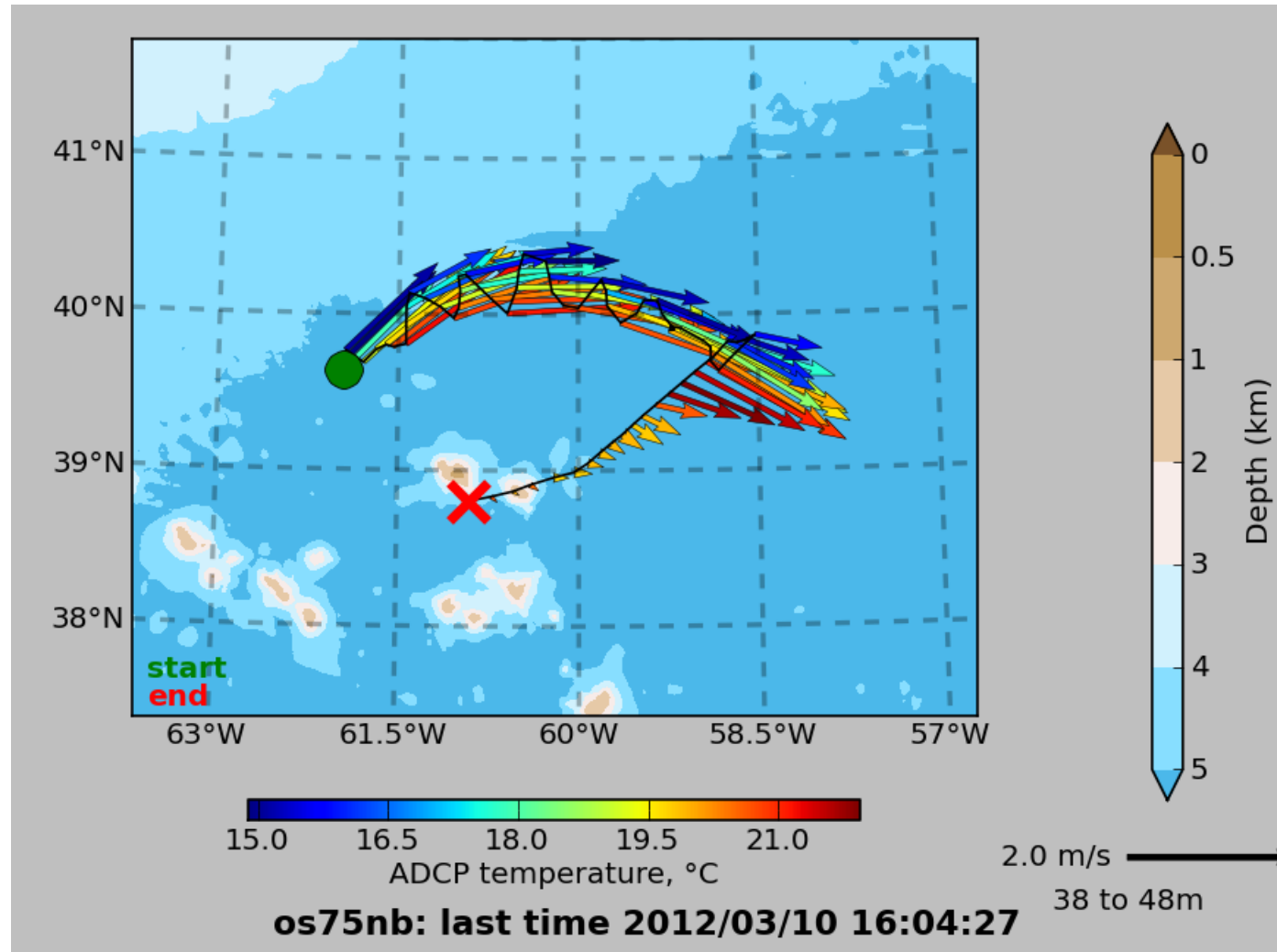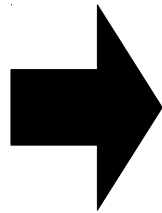
(1) ADCP+UHDAS installations

(2) Attitude (Heading) comparison

(3) RDI/RTI comment

(4) Show and Tell – cool device

(1) ADCP+UHDAS Report

RVTEC Nov 2013 – UHDAS/ADCP

primitive data

ocean velocities

UHDAS Goals

- Acquisition: reliable, robust, duplicate feeds

- Monitoring and remote troubleshooting

- Processing

  – Balance real-time output and post-cruise recovery

  – Minimal effort to "touch up" (if all goes well)

  – Portable code and documentation

- Happy Scientists

- Happy Techs

UHDAS Installations

- **14 UNOLS ships**: Atlantic Explorer, Atlantis, Endeavor, Kilo Moana, Knorr, Langseth, Melville, New Horizon, Oceanus, Point Sur, R.Revelle, R.G.Sproul, T.G.Thompson, F.G.Walton Smith

- **3 polar ships**: Healy, L.M.Gould, N.B.Palmer

- **2 NOAA ships**: Hi`ialakai, Ron Brown

- **1 "other" ship**: Ka`imikai O Kanaloa

- 1 "cooperative" installation – Tioga

Improvements since last RVTEC

- Code base
  - Removed use of Matlab
- UHDAS Installation
  - Upgrade to 12.04 Xubuntu (ongoing...)
  - Require: streamline multiple install methods
  - Goal: 'UHDAS' install from ISO (getting closer)
- Science Data User
  - Improve graphical editing tool
  - update documentation+virtual computer

Installations status

- All are running Python (no Matlab):

- Ships updated to Xubuntu 12.04:

  - Atlantic Explorer, Atlantis, Hi`ialakai, Healy, Kilo Moana, Knorr, KOK, L.M.Gould, N.B.Palmer, Oceanus, Ron Brown, T.Thompson, Walton Smith, Oceanus

- Ships needing this update

  - Endeavor, Langseth, Pt Sur, Melville, Revelle, Sproul, New Horizon

- New Installations:

  - Sikuliaq, (Pelican, (Falkor))

Problems: Attitude (ongoing)

- Ashtech

  - some resets required; some failed completely

  - new antennas; new termination made MUCH better

- Phins are not perfect

  - (occasionally) uncalibrated; or fails

- Seapath (occasionally) needs to be reset

- Coda-f185: requires a reset when leaving port

- POSMV various status:

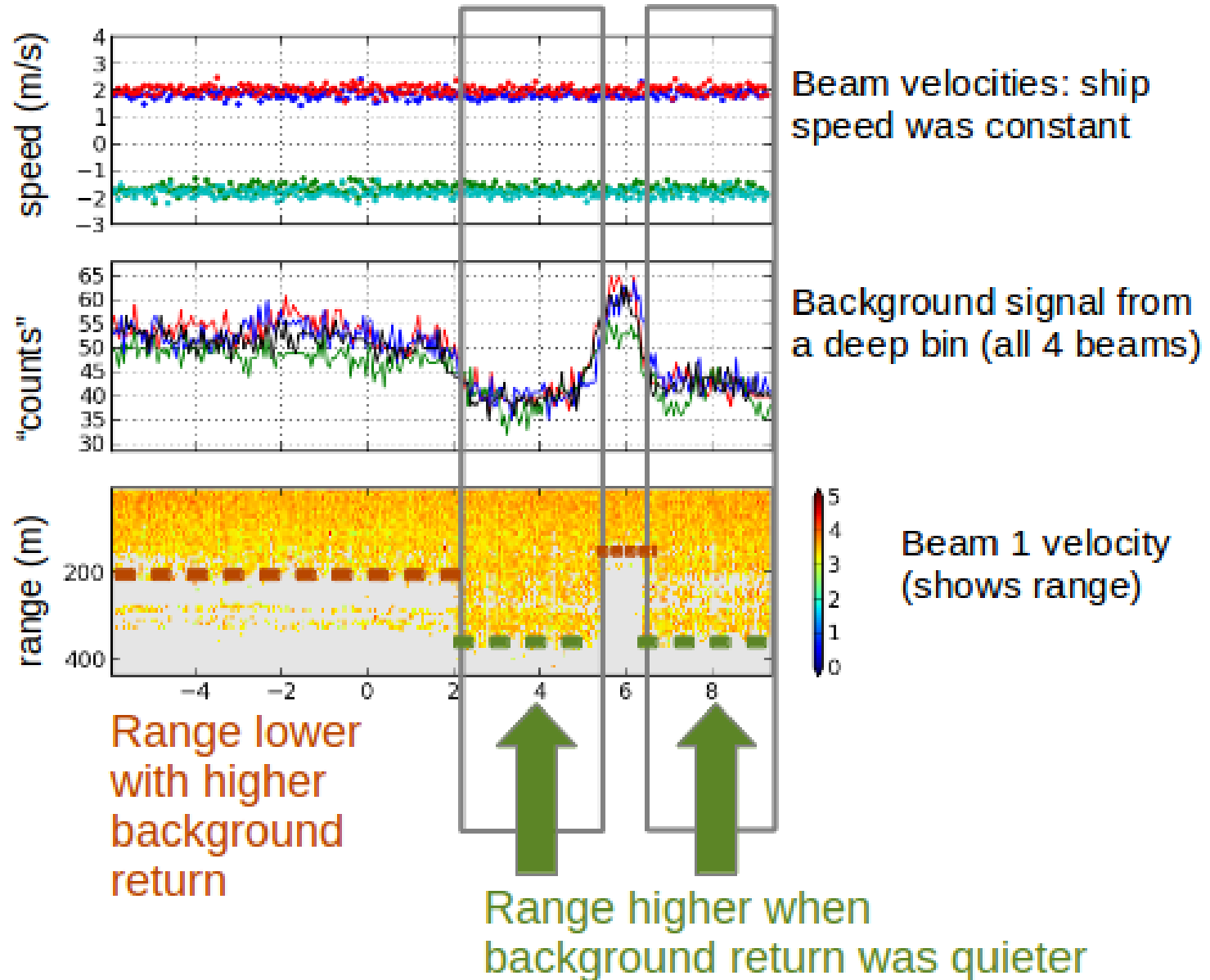 - only 50% of them are solid, rest glitchy (or broken)

ADCP Problems (since 2/2013)

- Langseth: OS75 failed (unknown cause)
- Walton Smith
  - BB600 lost one beam
  - OS75 failed (WHOI loaned OS75 in time for cruise)
- Melville: OS150 repaired, but still loses data on station
- Falkor
  - WH300 failed
  - OS75 failed
- Kilo Moana:
  - WH300 (bad trace; failed in warm water)

Healy:

Most Dramatic Example of EMF Noise

Transducer Cables: Proximity to Ship Cable Bundle Affects Range

Beam velocities: ship speed was constant

Background signal from a deep bin (all 4 beams)

Beam 1 velocity (shows range)

Range lower with higher background return

Range higher when background return was quieter

Expectations for 2014

- Update more ships to Xubuntu 12.04
- 1+ new installation
  - Sikuliaq
- Work with R2R+NOAA regarding ADCP data
- Revisit Documentation
- Continue to streamline installation process

Continuing Request:
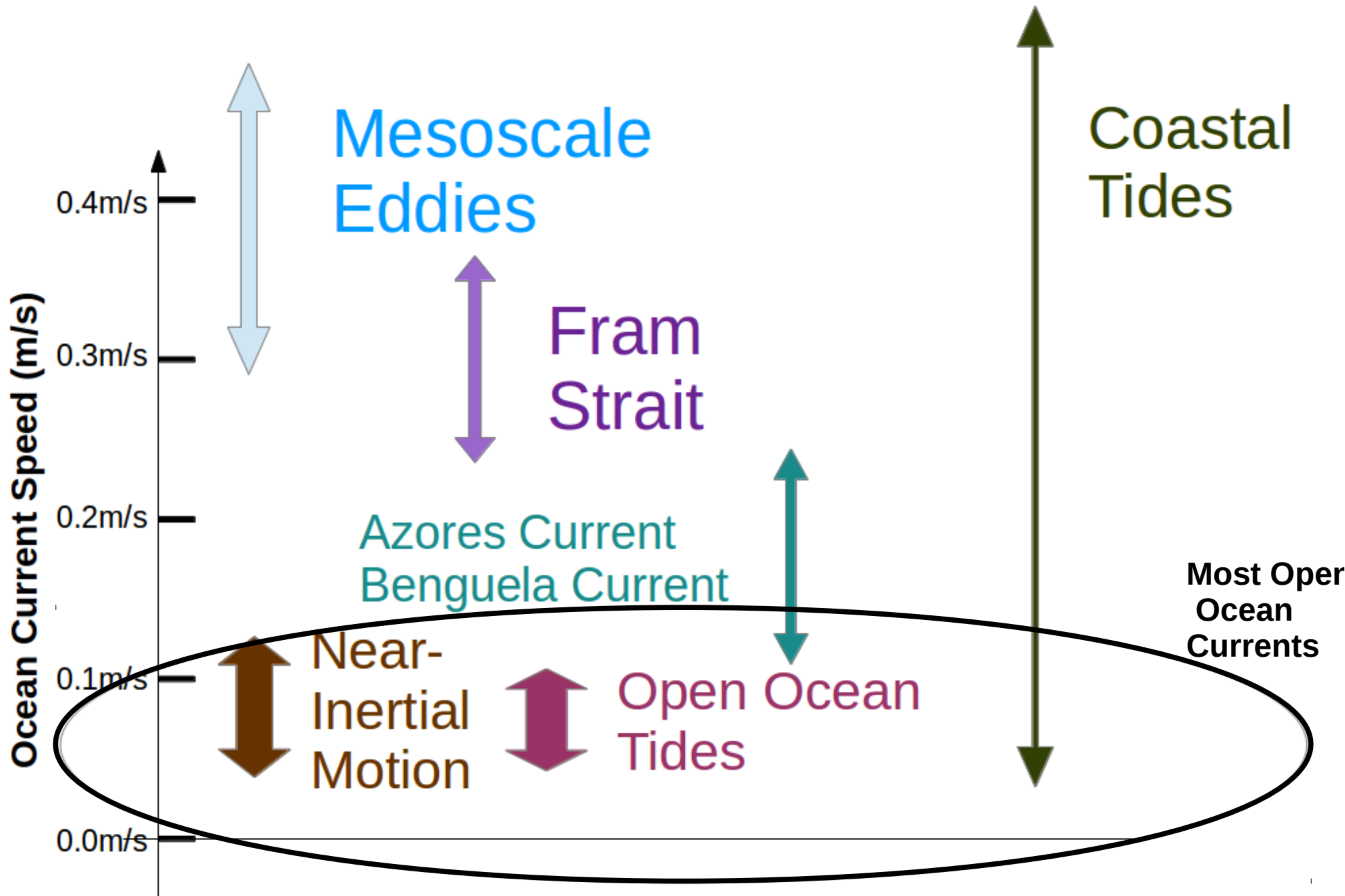## Keep us in the loop regarding

- New ADCP (requires configuration, calibration)
  - Includes special needs by Science
- Changes in serial feeds
- New attitude devices (we like to evaluate them)
- changes in networking
  - route to ship
  - infrastructure on ship

Protocol

- Always run "End Cruise" before archiving

- If rsync (regular backup)

  - **ALWAYS** use complete cruise name

(2) Attitude (Heading) Comparison

# Most Open Ocean currents are quite small; under 0.2m/s

Ocean Current Speed (m/s)

- 0.4m/s
- 0.3m/s
- 0.2m/s
- 0.1m/s
- 0.0m/s

Mesoscale Eddies

Fram Strait

Coastal Tides

Azores Current
Benguela Current

Near-Inertial Motion

Open Ocean Tides

Most Open Ocean Currents

ADCP challenge:

(1) Signal:

      open ocean currents are quite small,
      often under 0.1-0.2m/s
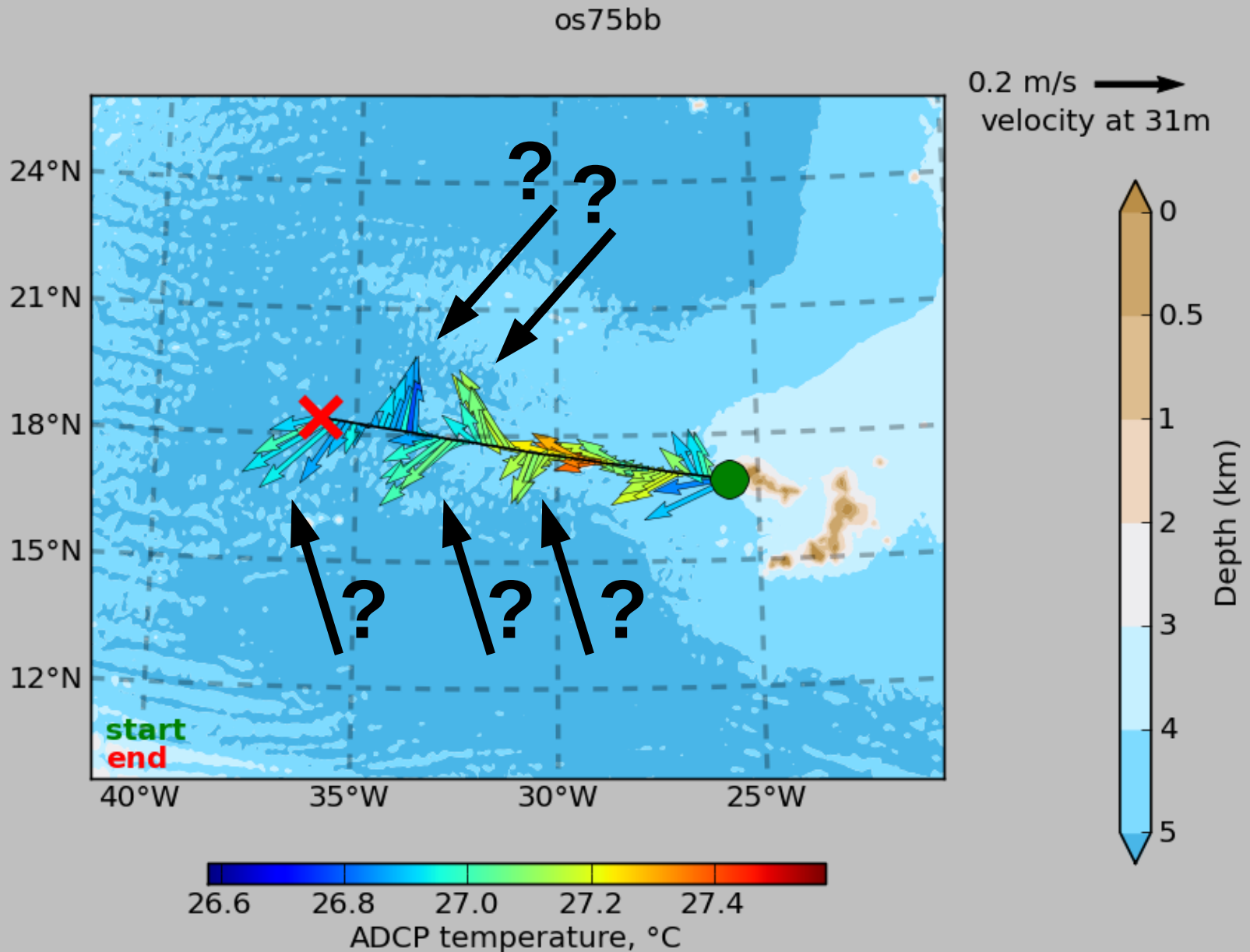
(2) Error:

      1° heading error at 10kts causes
      0.1m/s error in ADCP ocean current
              - error is in crosstrack direction
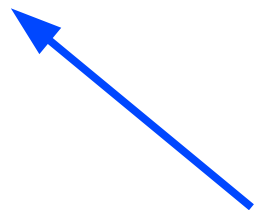
same size as
ocean currents

# Are these actual currents? or fiction (from heading error)

Heading devices used by UHDAS installations (Nov 2013)

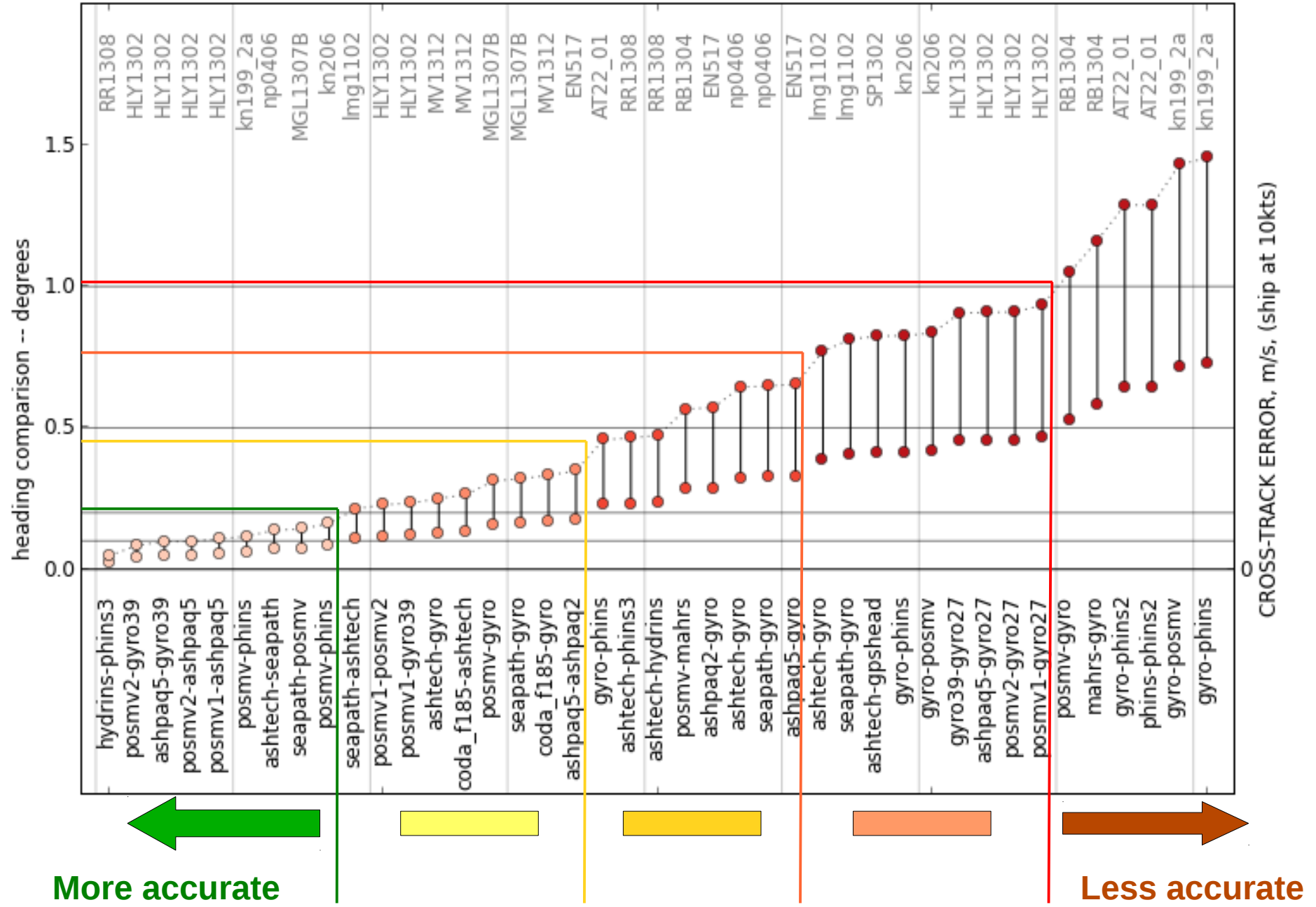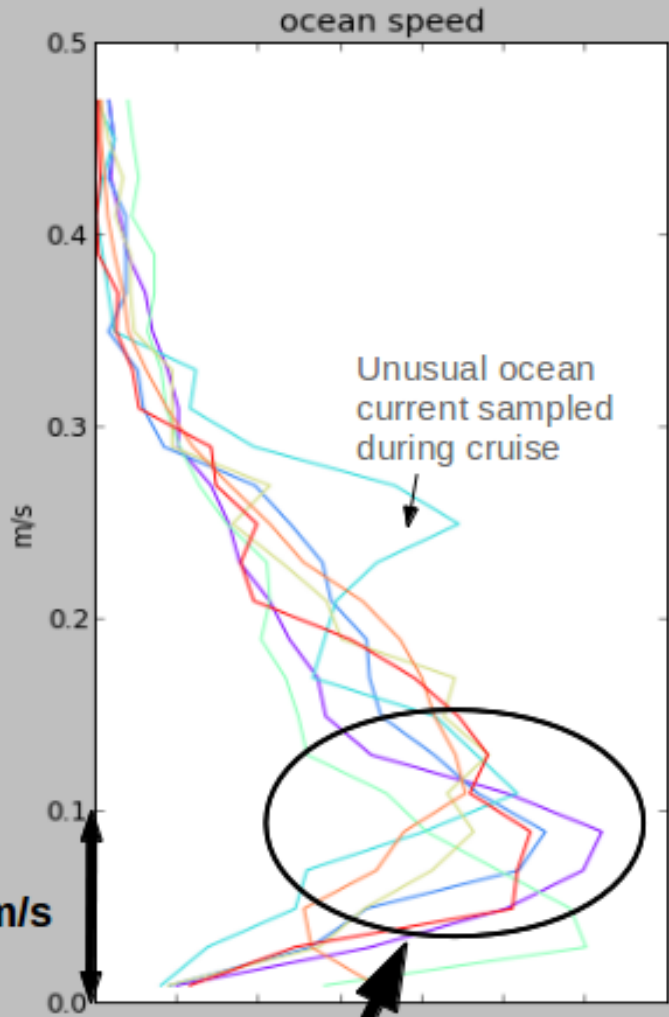| Ship	Ashtech	Mahrs	Phins	Coda	POSMV	Seapath	gyro note	gyro
Atlantic Explorer	ADU5							Sperry MK37
Atlantis			Phins3 Phins3					Sperry MK37E
Endeavor	ADU2 ADU5							Sperry MK37
Hi`ialakai					320v4			Meridian Standard
Healy	ADU5				320v2 320v2		FOG	Sperry MK27 Sperry MK39
KOK		TSS						?
Kilo Moana					320v4			Sperry Decca Bridgemaster E250
Knorr			Phins3		320v3			Sperry MK27
L.M.Gould						330 (200)*		Meridian Bridgemate
Langseth					320v?			Sperry GC80
Melville	ADU2			F185				Meridian Surveyor
New Horizon	ADU2							Sperry MK37
N.B.Palmer						200 200 (300*)		Yokogawa KM008-E
Oceanus	ADU5							Sperry MK37
Point Sur	ADU5							Sperry Gyrosphere TS-X
Ron Brown		TSS			320v4			Meridian Standard
Revelle	ADU2		Phins3				inertial	Hydrins
Sproul	ADU2						2GPS+tilt	Furuno sc-30
Thompson					320v4			Sperry MK37
Walton Smith					320v2			Meridan (xx)

$20K ⟵ $80-$120K ⟶

Comparison: various heading devices vs/ accurate heading device
plotted: 1-2 standard deviations (as in ADCP processing)

Stronger
Ocean
Currents

background
ocean
currents

More accurate

Less accurate
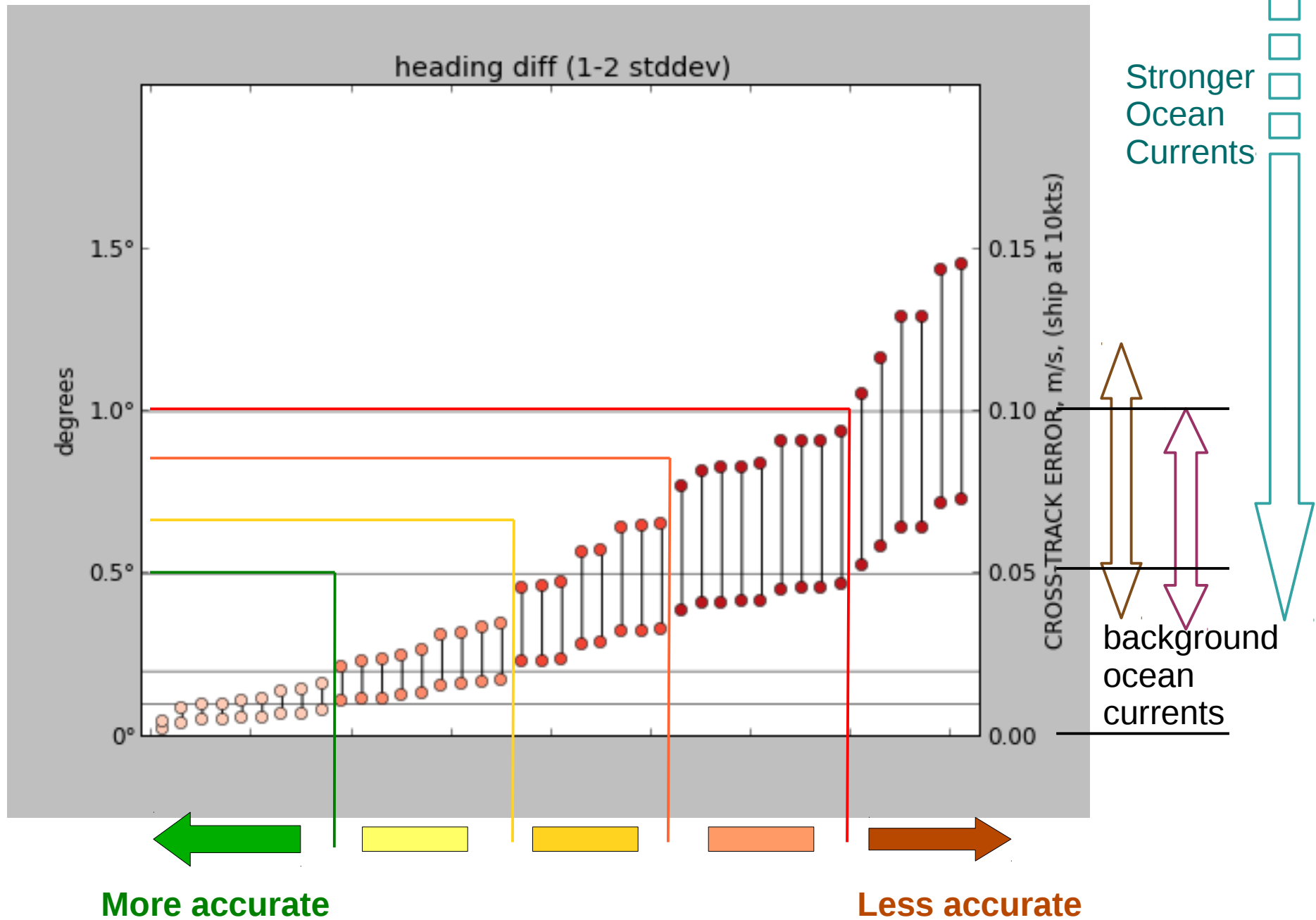
1-2 stddev(ADCP heading correction) i.e. 5-min edited dh

Histogram of ocean speeds

ocean speed

Unusual ocean current sampled during cruise

0.1m/s

heading (deg)   ERRORS   ocean speed

heading diff (1-2 stddev)

1-2 Standard Deviations of heading difference i.e. about 30% of data in the cruise have heading errors in this range
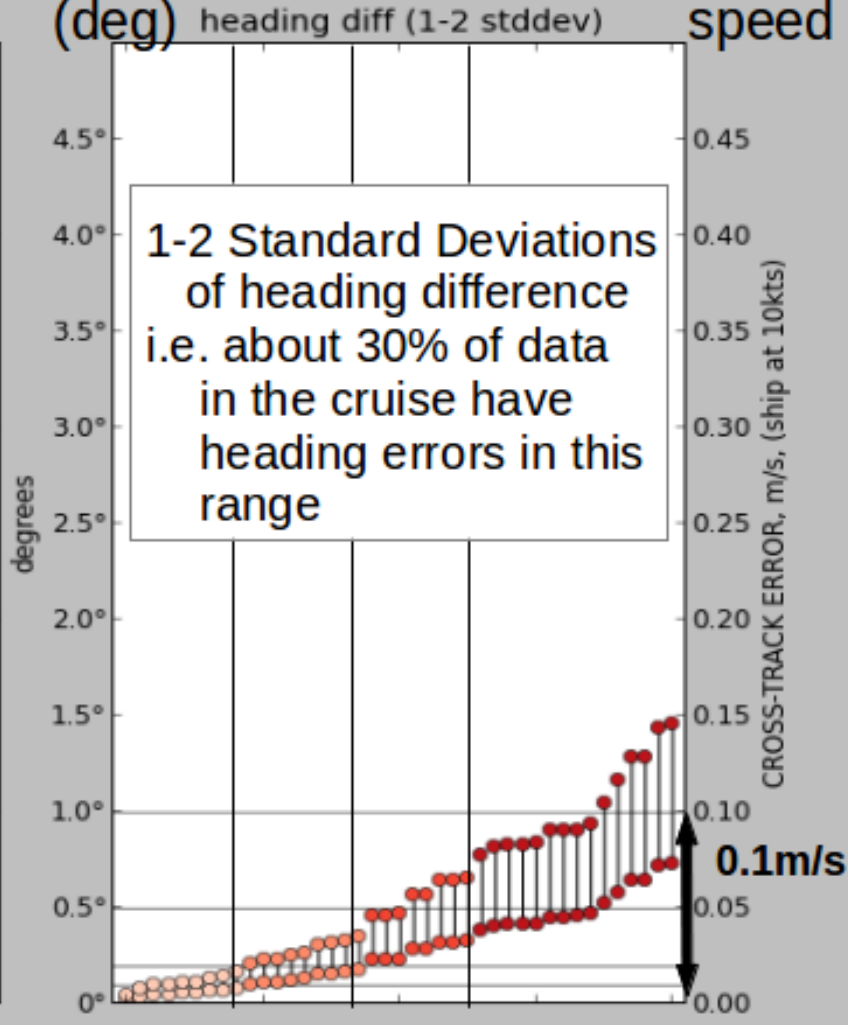
CROSS-TRACK ERROR, m/s, (ship at 10kts)

0.1m/s

Most open ocean currents on these cruises were centered at 0.1m/s

1deg heading error at 10kts makes a 0.1m/s error in ocean currents (crosstrack)

Final request

... as always:

Send your needy scientists to Jules

(3) RDI/RTI Comment

RDI (Teledyne R.D. Instruments)

RTI (Rowe Technologies Inc)

Cool Tool
www.isostick.com