SWAP
and other things
on a two icebreaker cruise
USCGC Healy
CGC Louis S. St-Laurant

a very brief report of work done
by Steve Roberts, Val Schmidt and Dale Chayes

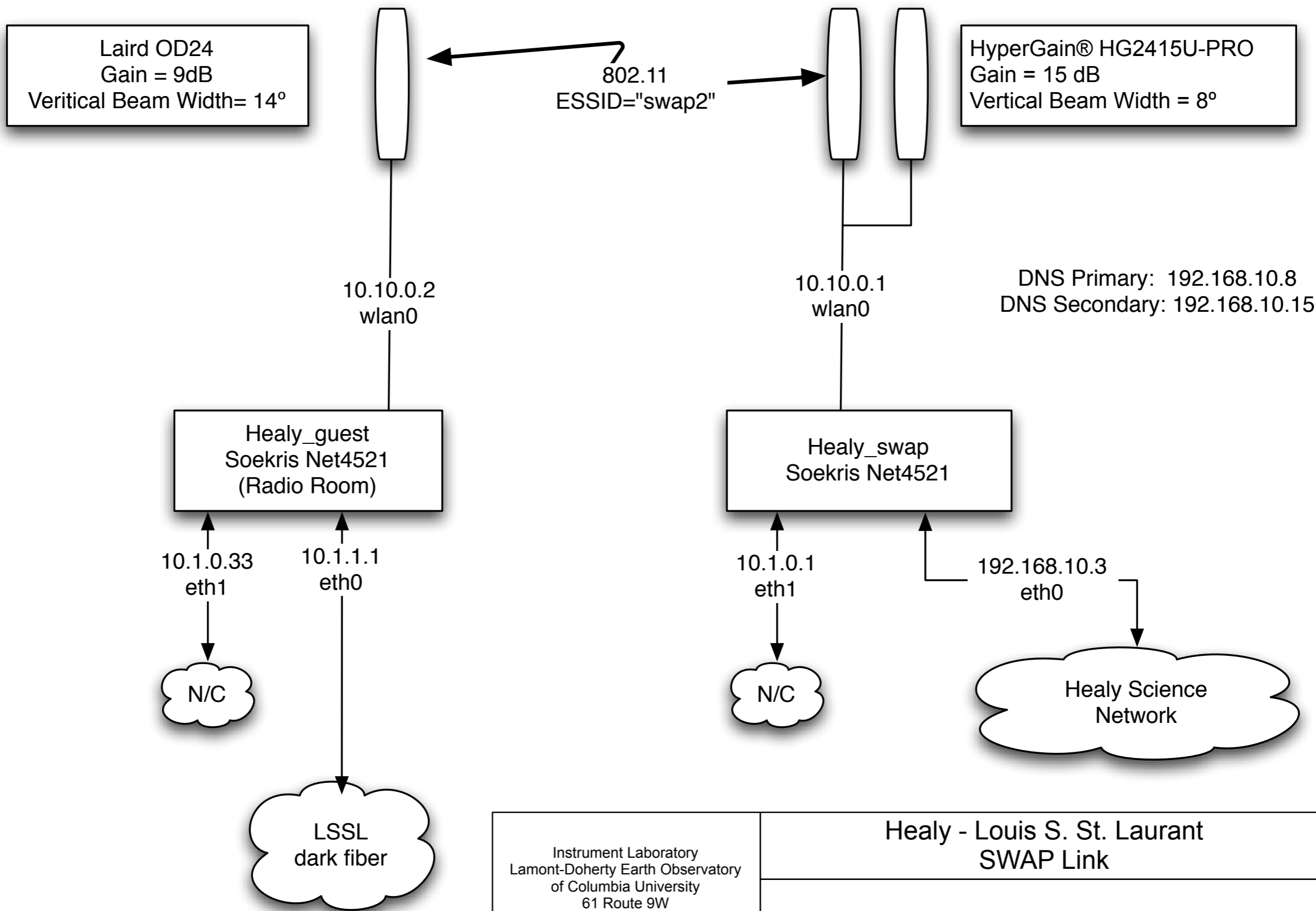Dale Chayes
Lamont Research Engineer

RVTEC October 30, 2008

LAMONT-DOHERTY
EARTH OBSERVATORY
INSTRUMENT LABORATORY

Scope of this talk

- SWAP

- AIS

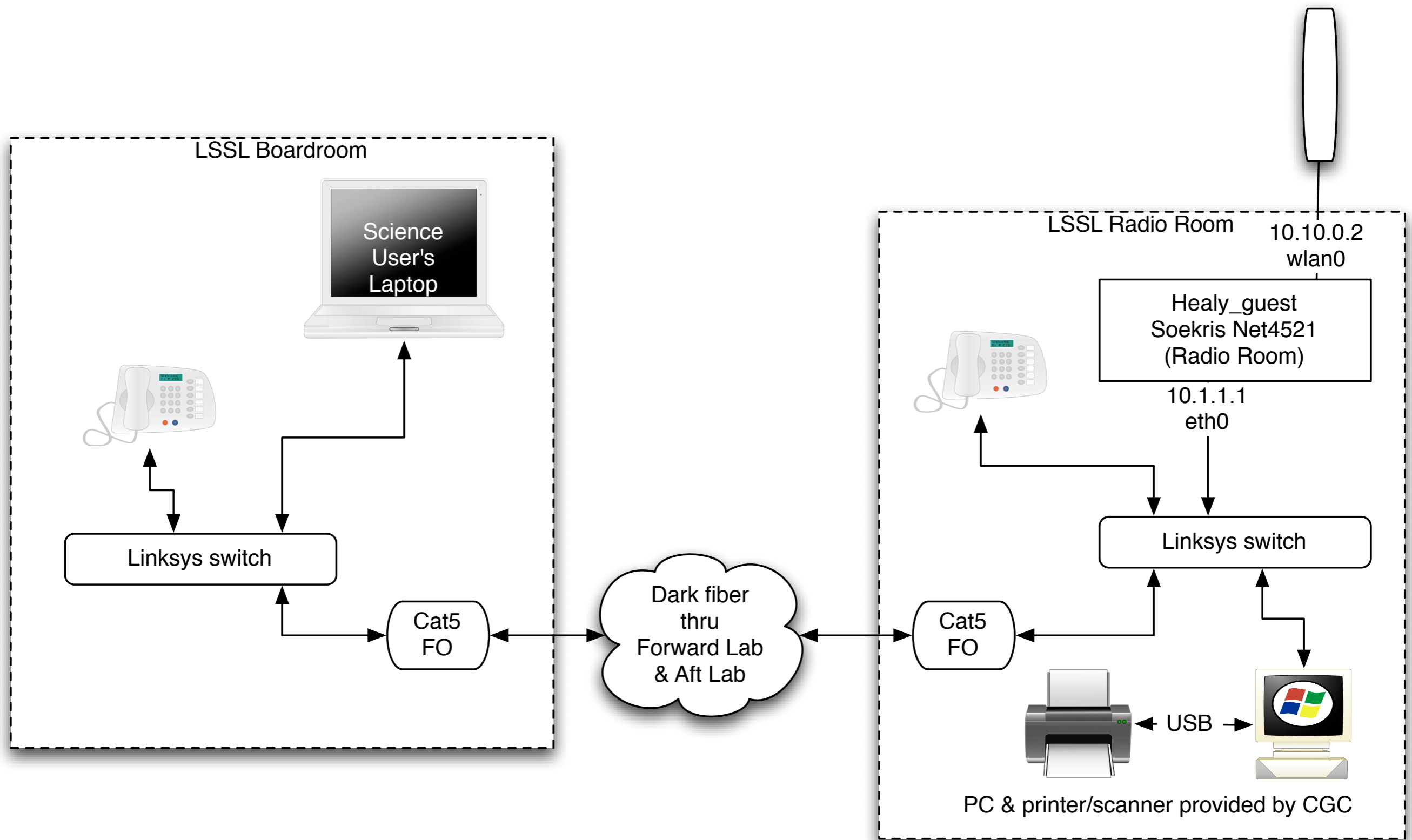- Heading at high latitude

- Met sensors ('cause we are at COAPS)

Ship to datacom Design goal(s)

- Continuous connection between ship's (science) working in close proximity
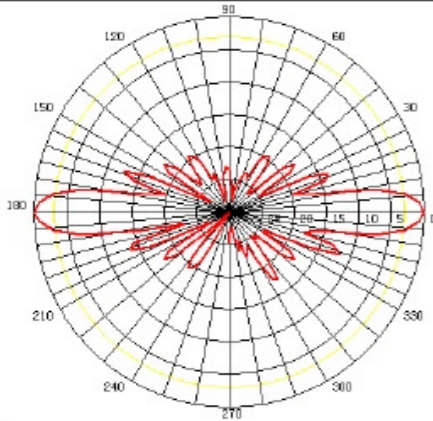
- ssh & http

- VOIP phones

Laird OD24
Gain = 9dB
Veritical Beam Width= 14º

HyperGain® HG2415U-PRO
Gain = 15 dB
Vertical Beam Width = 8º

802.11
ESSID="swap2"

10.10.0.2
wlan0

10.10.0.1
wlan0

DNS Primary: 192.168.10.8
DNS Secondary: 192.168.10.15

Healy_guest
Soekris Net4521
(Radio Room)

Healy_swap
Soekris Net4521

10.1.0.33
eth1

10.1.1.1
eth0

10.1.0.1
eth1

192.168.10.3
eth0

N/C

N/C

Healy Science
Network

LSSL
dark fiber

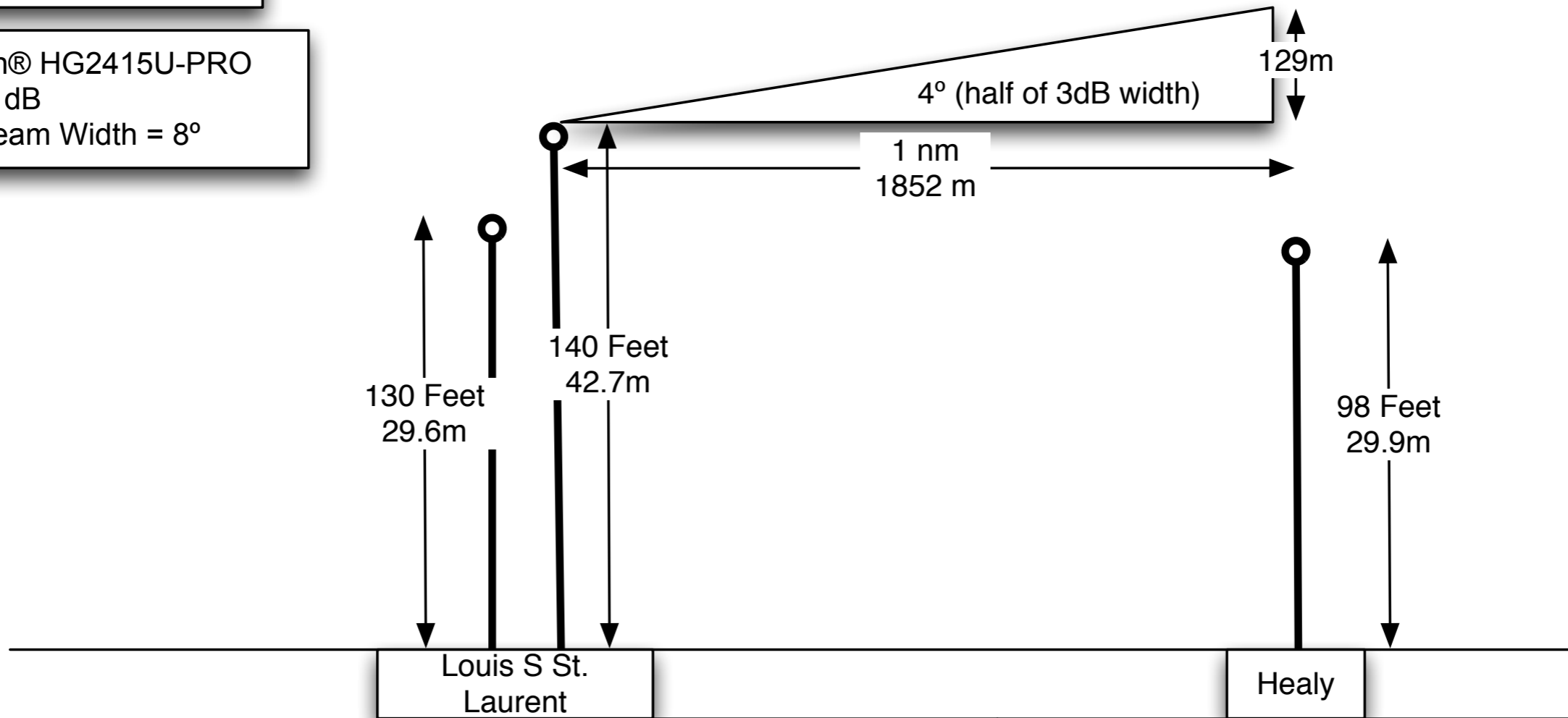| Instrument Laboratory Lamont-Doherty Earth Observatory of Columbia University 61 Route 9W Palisades, NY 10964	Healy - Louis S. St. Laurant SWAP Link				
Drawn 2008-09-11 Updated: 2008-09-25	SIZE -	FSCM NO	DWG NO		REV -
Dale Chayes dale@ldeo.columbia.edu	SCALE None		SHEET 1OF 2		

One–line diagram of the wireless connection in support of science for HLY0806

LSSL Boardroom

Science User's Laptop

Linksys switch

Cat5 FO

Dark fiber thru Forward Lab & Aft Lab

VOIP Phones: Linksys/Cisco IP Pone SPA921

LSSL Radio Room

10.10.0.2
wlan0

Healy_guest
Soekris Net4521
(Radio Room)

10.1.1.1
eth0

Linksys switch

Cat5 FO

USB

PC & printer/scanner provided by CGC

	HLY0806 Healy - Louis S. St. Laurant LSS Details		
Instrument Laboratory Lamont-Doherty Earth Observatory of Columbia University 61 Route 9W Palisades, NY 10964			
Drawn 2008-09-11 Updated: 2008-09-25	SIZE	FSCM NO	DWG NO	REV
	-			-
Dale Chayes dale@ldeo.columbia.edu	SCALE None		SHEET 7OF 8

One–line diagram of the wireless connection details on the LSSL.

HyperGain® HG2415U-PRO
Gain = 15 dB
Vertical Beam Width = 8º

Laird OD24
Gain = 9dB
Veritical Beam Width= 14º

HyperGain® HG2415U-PRO
Gain = 15 dB
Vertical Beam Width = 8º

129m

4º (half of 3dB width)

1 nm
1852 m

140 Feet
42.7m

130 Feet
29.6m

98 Feet
29.9m

Louis S St.
Laurent

Healy

Note:
1) Drawing not to scale
2) Worst case is a pair of HG2415Us with 8º
vertical beam width. Even with moderate rolling,
the other ship should always be in the beam
pattern.

HLY0806 SWAP Antenna Beam Patterns

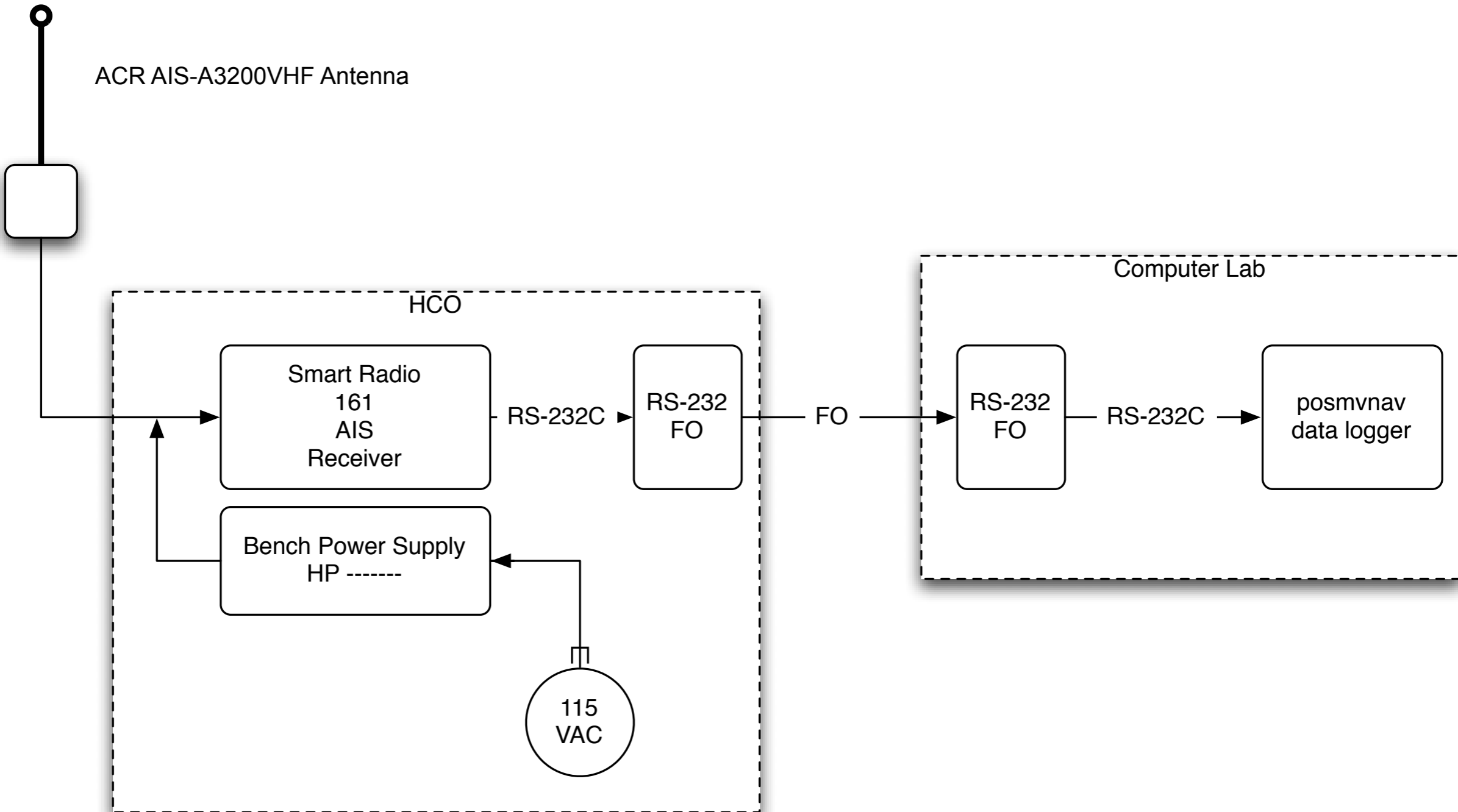|				
Drawn 2008-09-23 Updated:	SIZE	FSCM NO	DWG NO	REV
	-			-
Dale Chayes dale@ldeo.columbia.edu	SCALE	None	SHEET	1OF 1

SWAP summary

- Multiple confounding start-up issues: connections, connectors, corrupt flash

- Range was less than expected (icing, ?)

- Link often did not "recover" itself

- Antenna field of view is (always) an issue?

- Keeping it running & helping users was labor intensive

- It was very effective for science

AIS

- We needed real-time position of the other ship (LSSL) in our real-time GIS

- Didn't want to depend on the wireless link due to range

- High "overhead" to connect to Healy's existing AIS system

- Purchased ($250 + shipping) AIS receiver & antenna (only)

- Used existing code (Kurt Schwer, UNH/CCOM) http://vislab-ccom.unh.edu/

ACR AIS-A3200VHF Antenna

HCO

Smart Radio
161
AIS
Receiver

RS-232C ▶ RS-232
FO

FO ▶

Bench Power Supply
HP -------

115
VAC

Computer Lab

RS-232
FO

RS-232C ▶ posmvnav
data logger

	Automatic Identification System Receiver (Science)				
Instrument Laboratory Lamont-Doherty Earth Observatory of Columbia University 61 Route 9W Palisades, NY 10964					

Drawn 2008-09-27
Updated:

Dale Chayes
dale@ldeo.columbia.edu

SIZE	FSCM NO		DWG NO		REV
-					-
SCALE	None		SHEET	3OF 4	
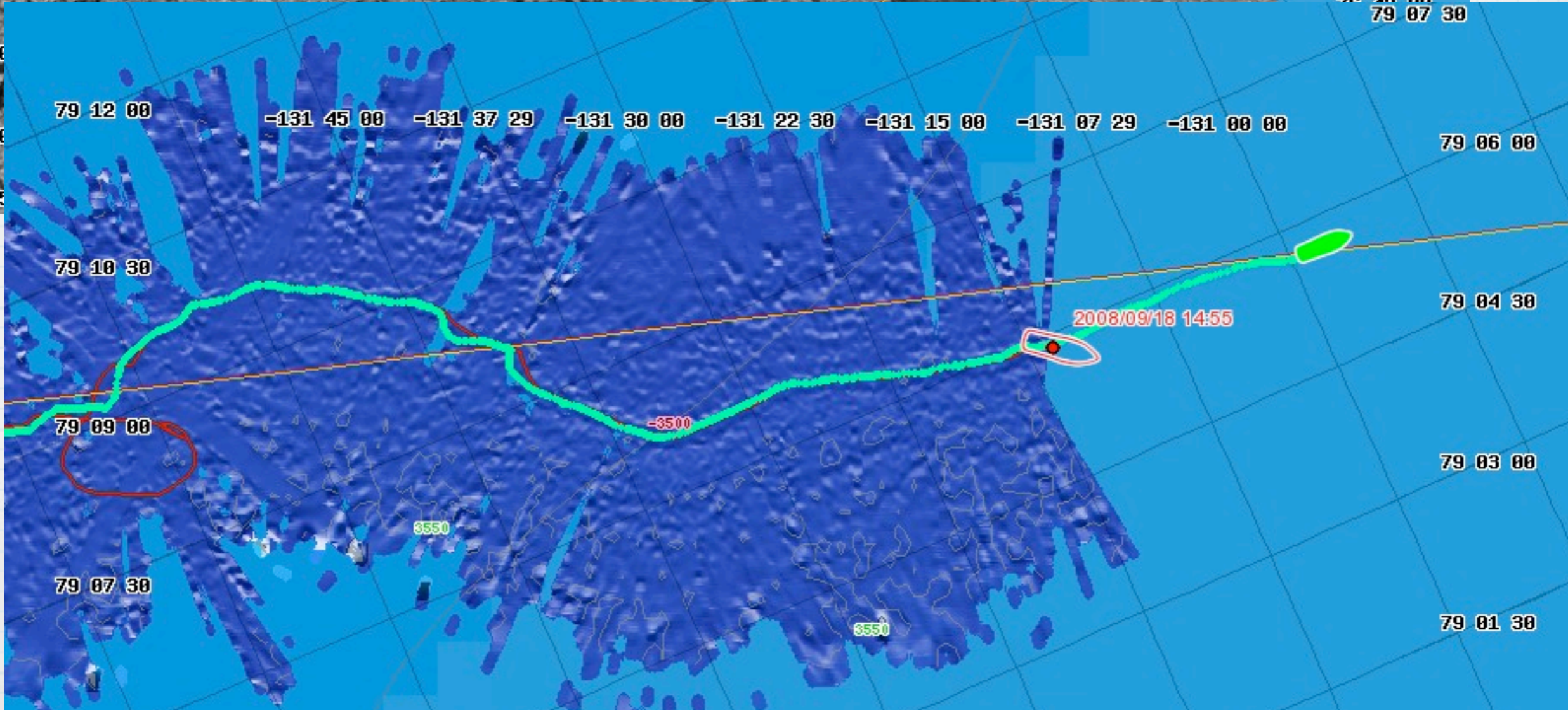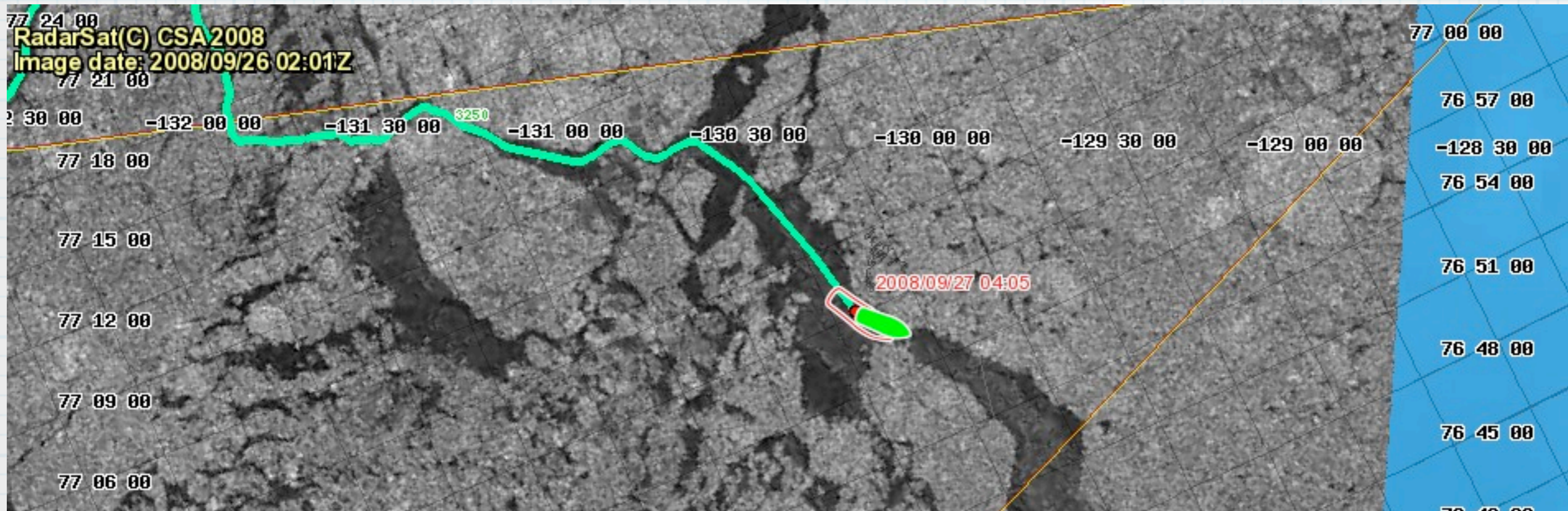
Screen shots from the Healy real-time GIS showingAIS data (green) for LSSL and Healy real-time navigation.
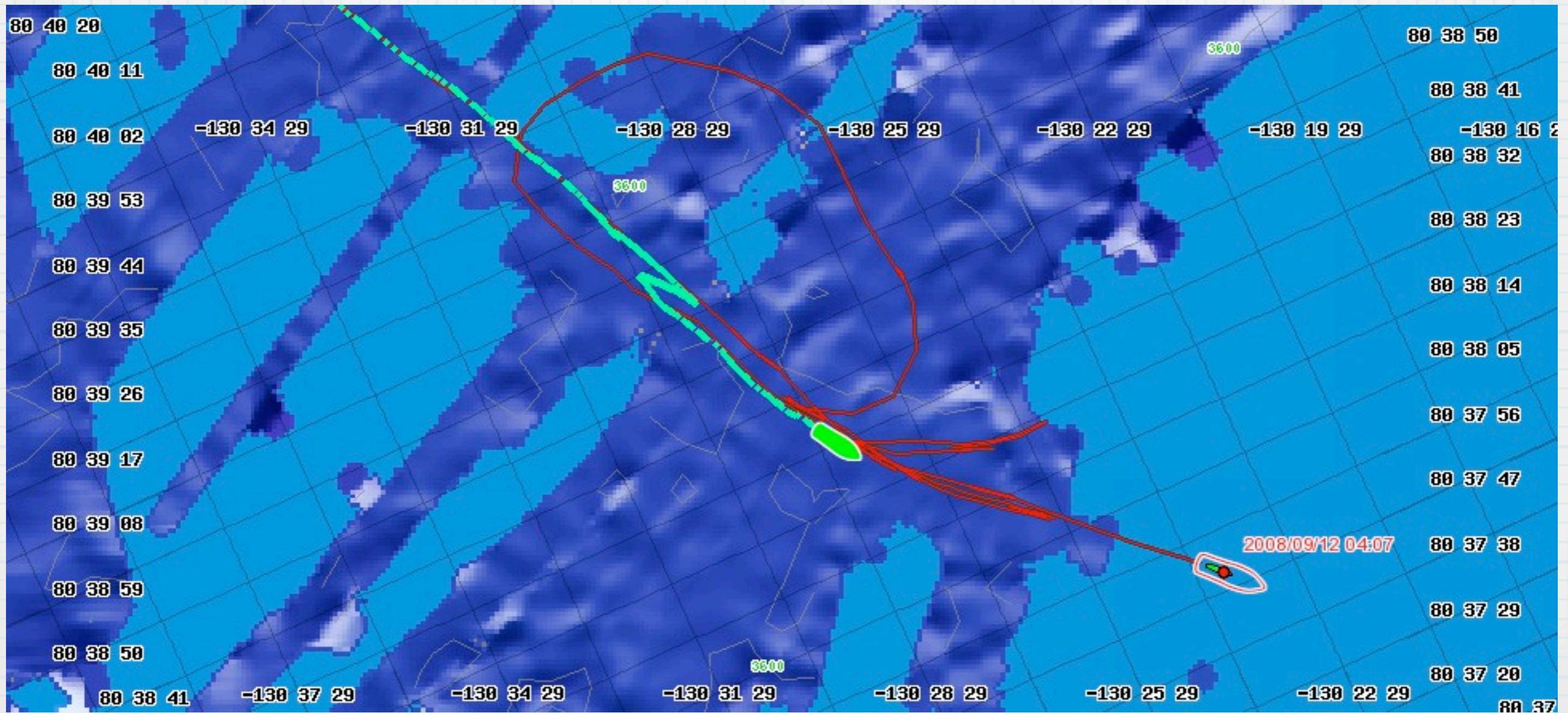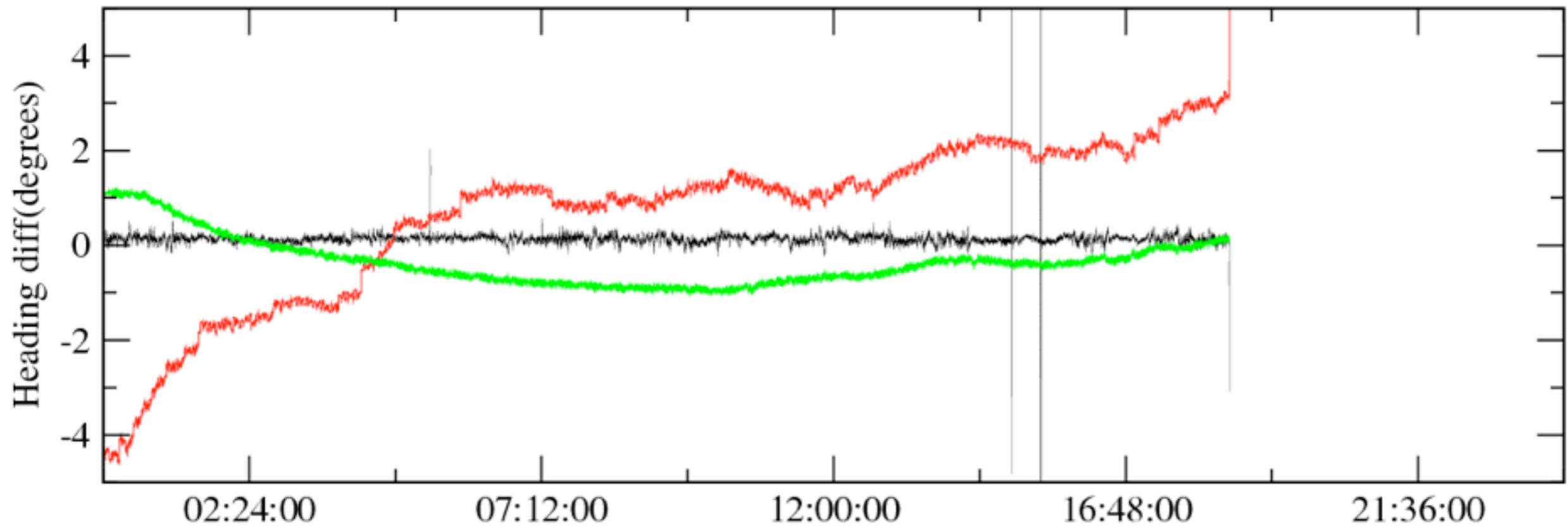
Ship tracks for LSSL (green) and Healy (red) showing an event where Healy assisted in freeing LSSL from heavy ice.

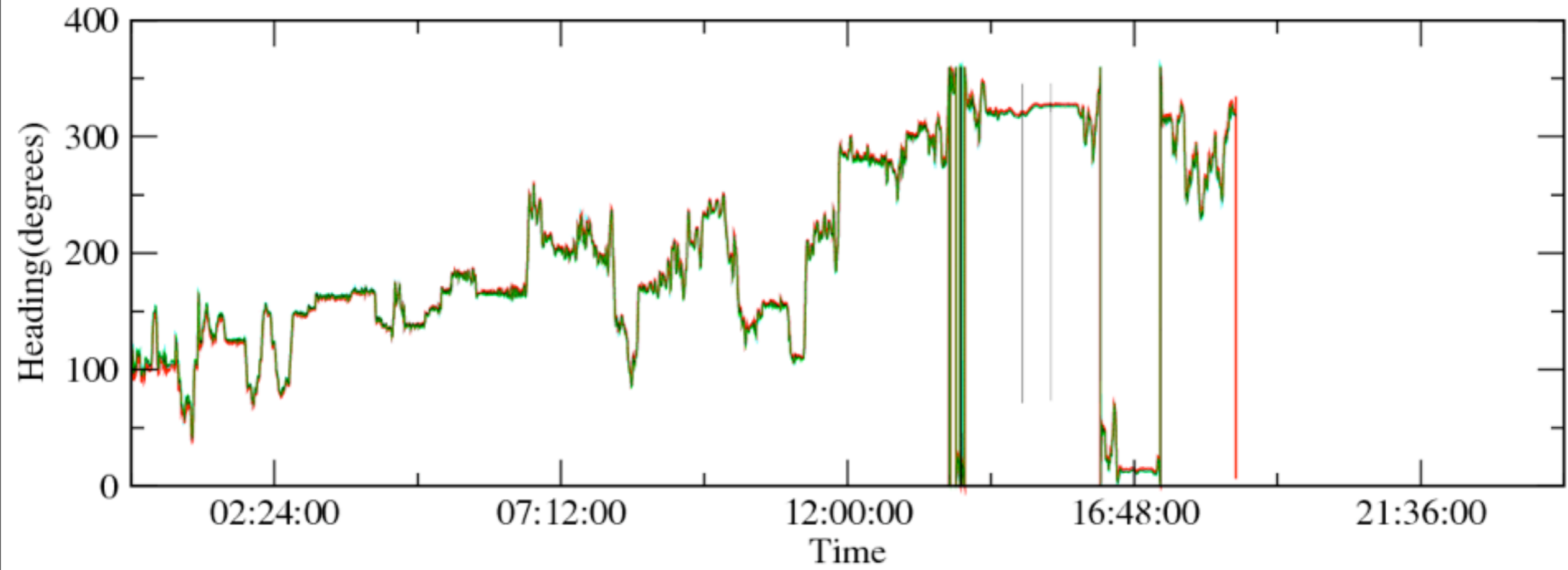# Healy has four sources of "high quality" heading at high latitude

- Applanix POS/MV-320

- Thales (Ashtech) ADU-5

- Sperry MK27

- Sperry MK39

Heading differences 2008/09/27

POSMV/ADU5(black) POSMV/MK27(red) POSMV/MK39(green)

POSMV(cyan) ADU5(black) MK27(red) MK39(green)

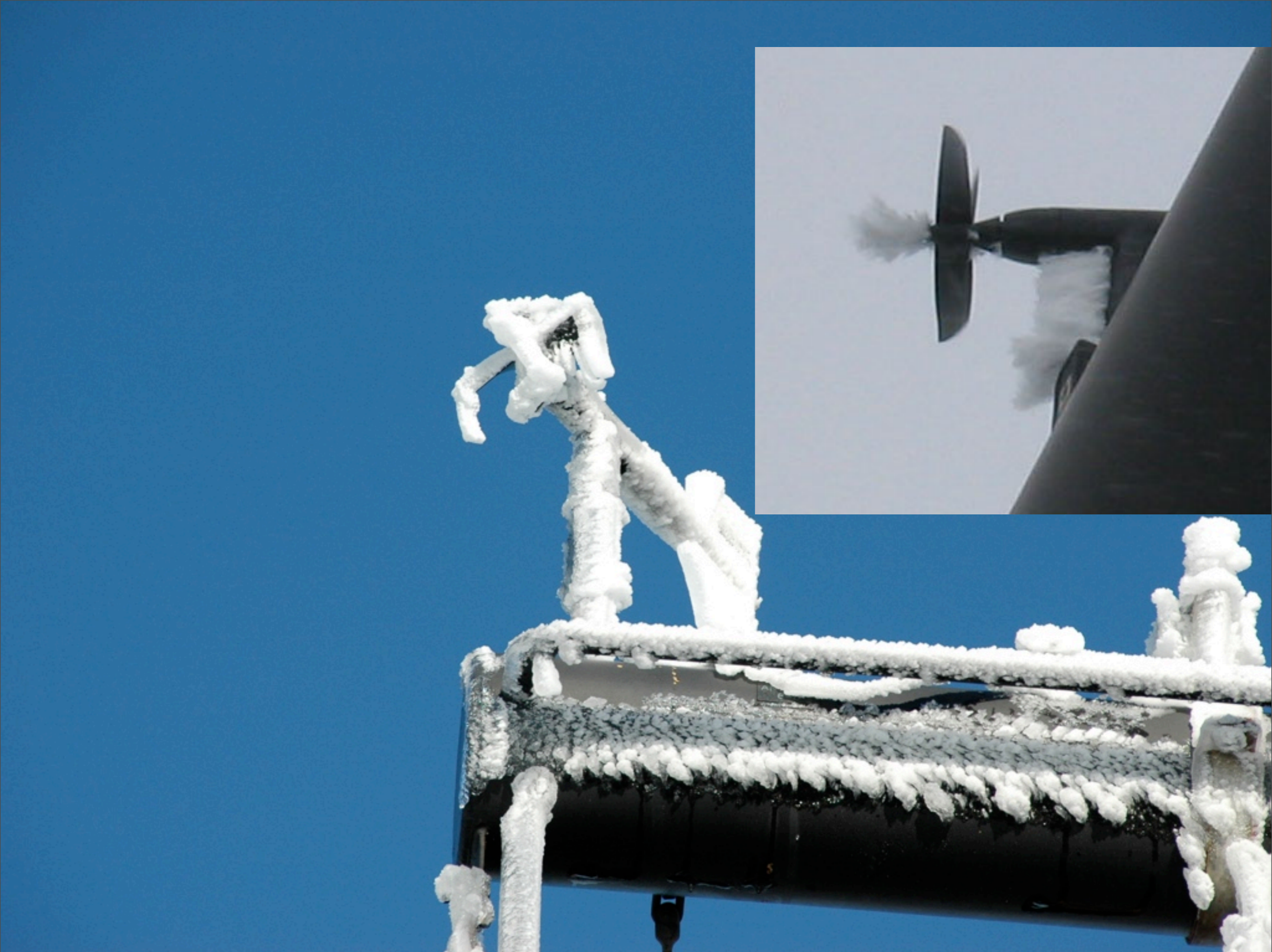# Met Sensors
various kinds of icing cause data quality problems

Met sensors, including heated ultrasonic anemometer, rain gauge, temperature, humidity sensors on the Healy's foremast.

Icing of various severity on mechanical anemometers on Healy.

Icing of various met sensors on LSSL

LSSL leading the Healy