CHC-NSC 2018
www.chc-nsc2018.ca
Victoria, B.C.
March 26-29, 2018
Victoria, C.B.
26 au 29 mars 2018
Land and Sea Shaping the World
Terre et Mer Façonnant le Monde

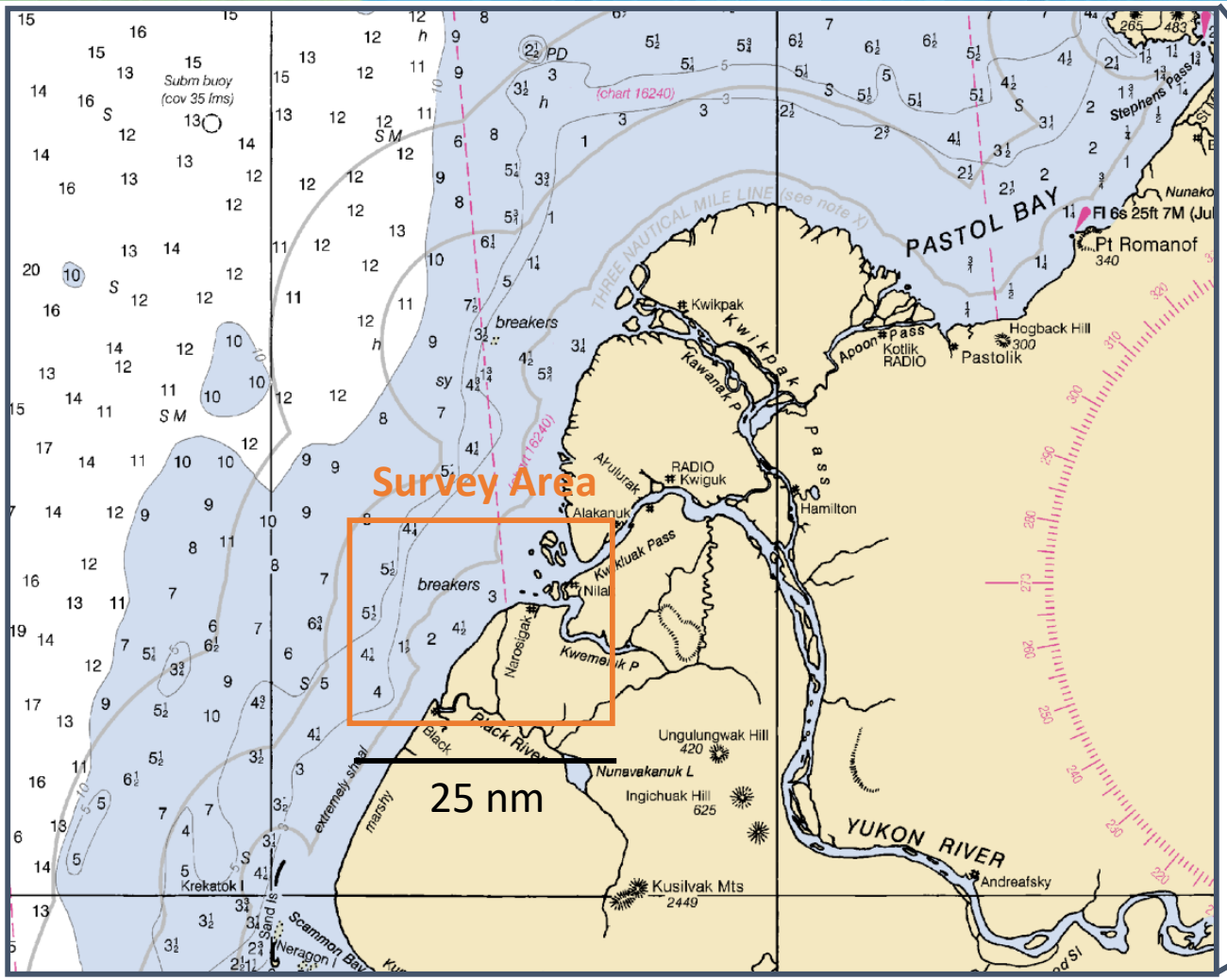
Yukon River Delta Investigations to Support Satellite Derived Bathymetry Validation

LT Damian Manda and Christina Belton
US National Oceanic and Atmospheric Administration

#chcnsc2018

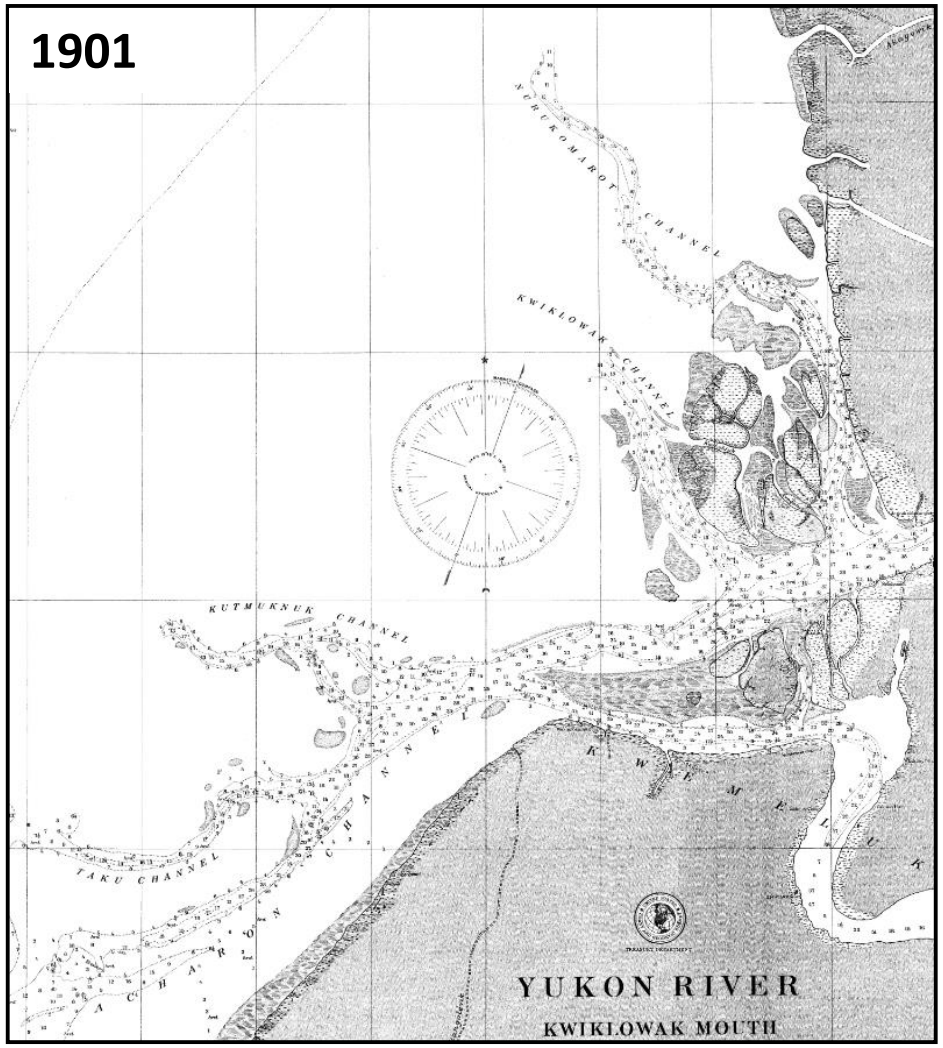
CHC-NSC 2018

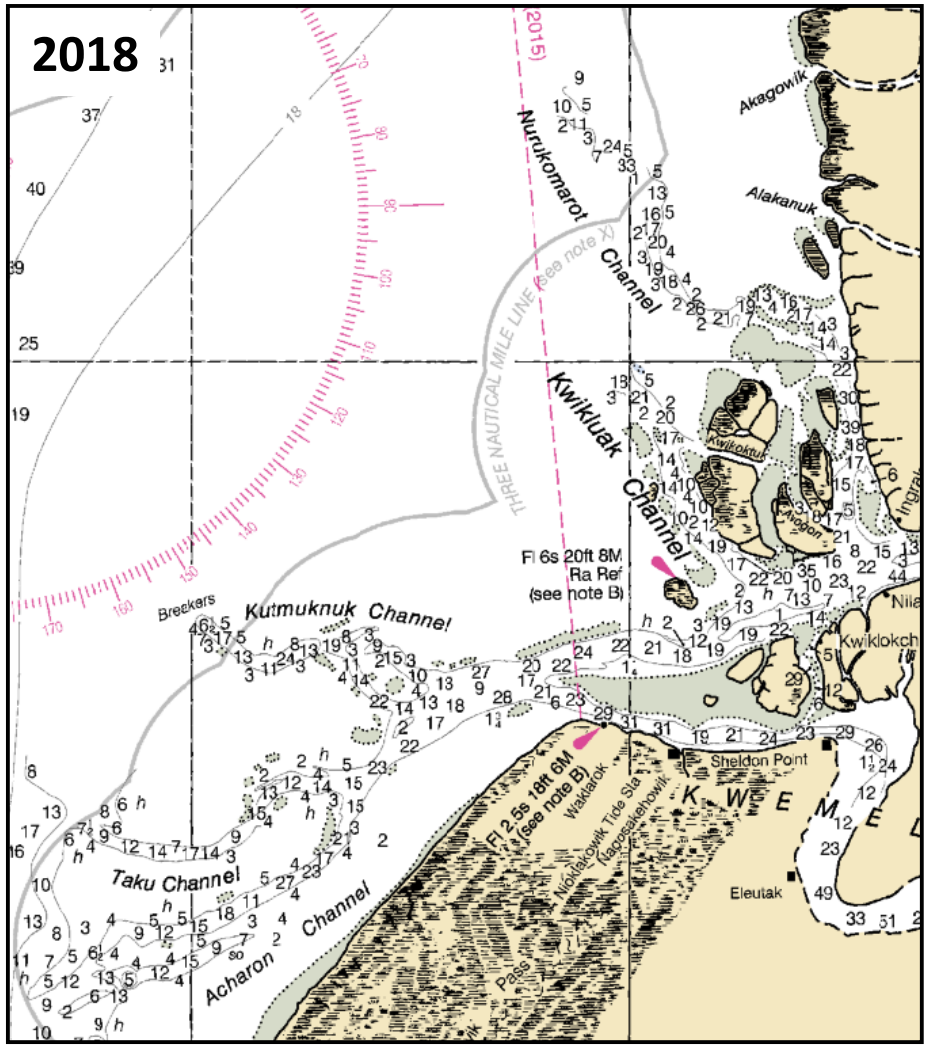
www.chc-nsc2018.ca



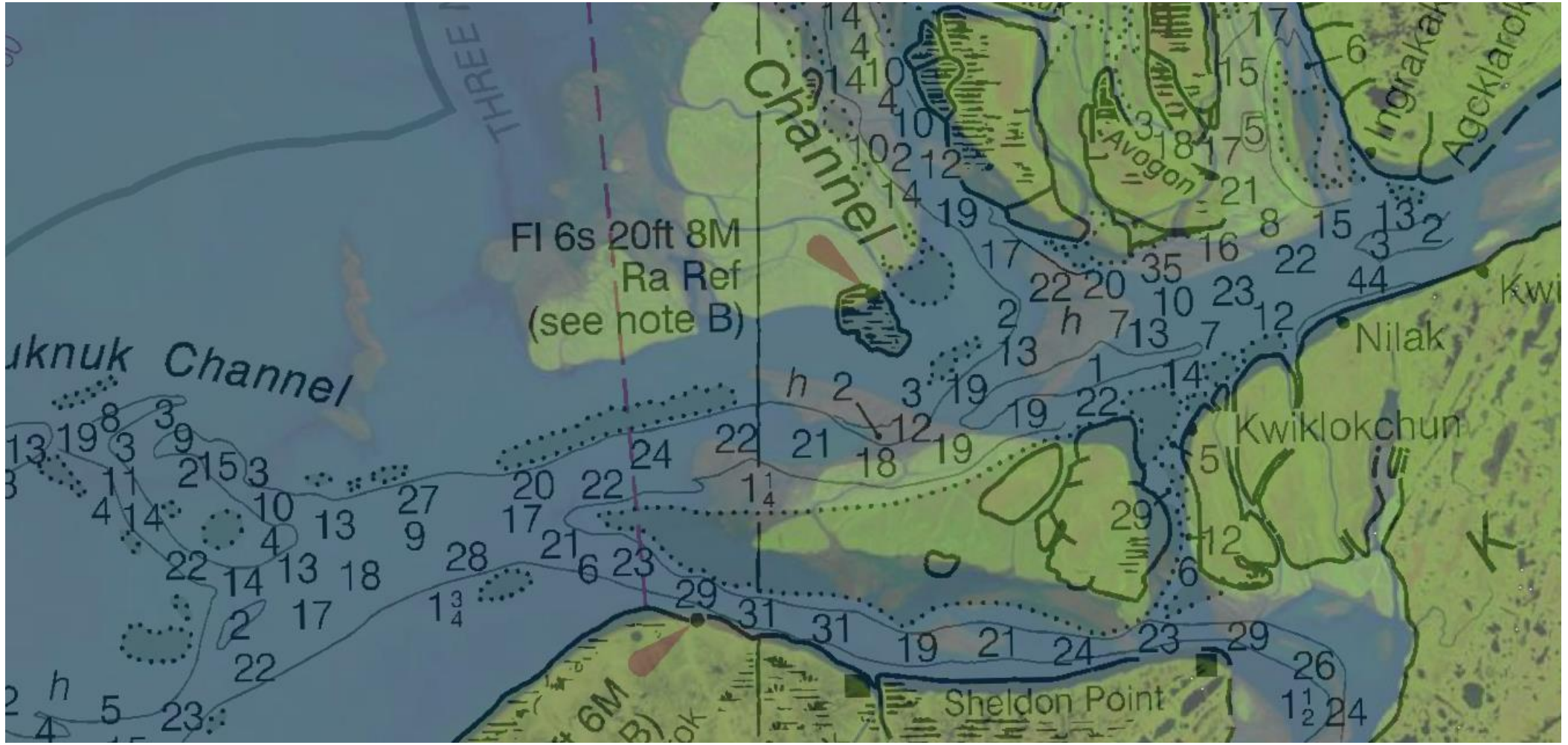
#chcnsc2018

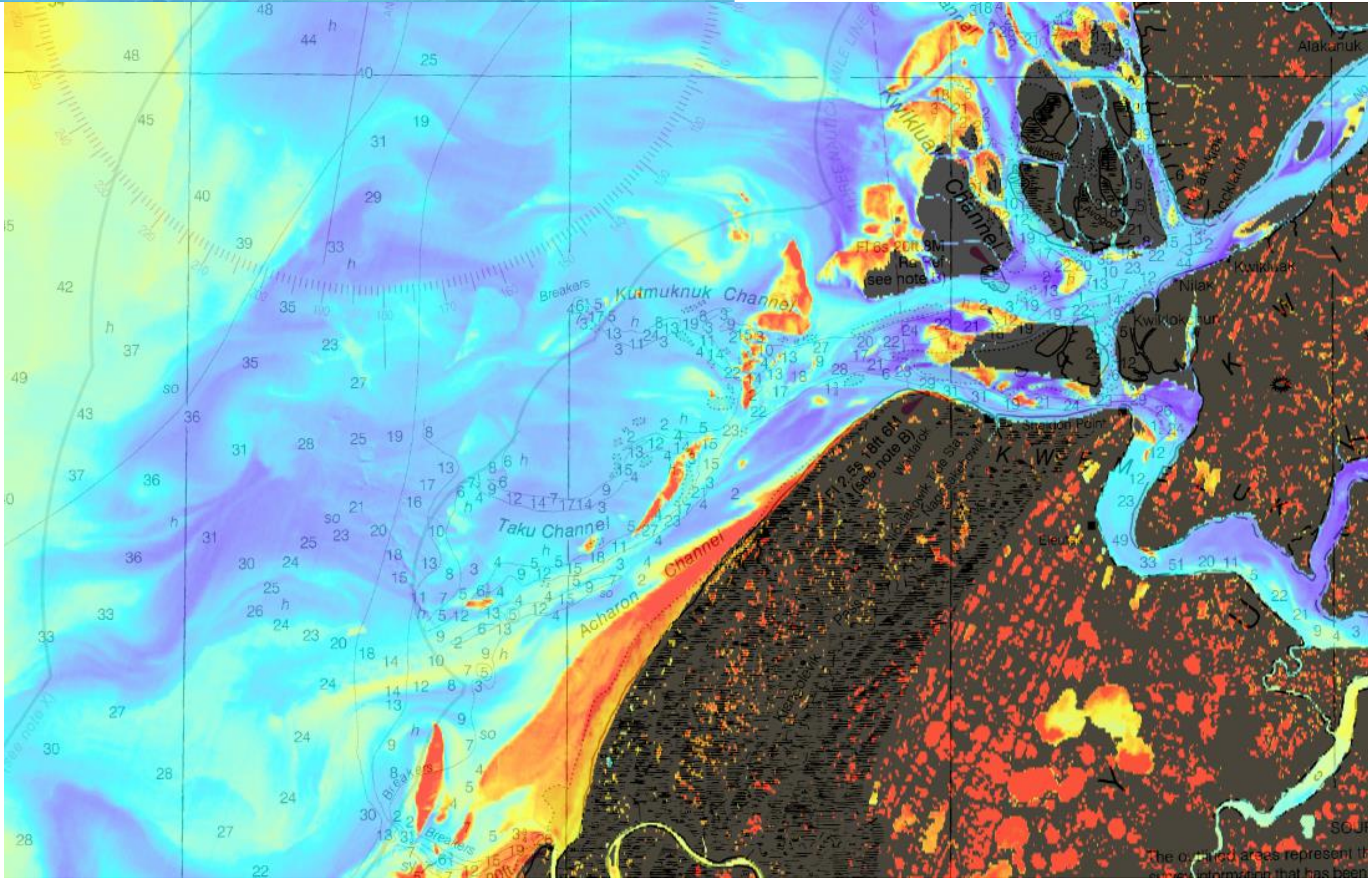
Prior Surveyed Data

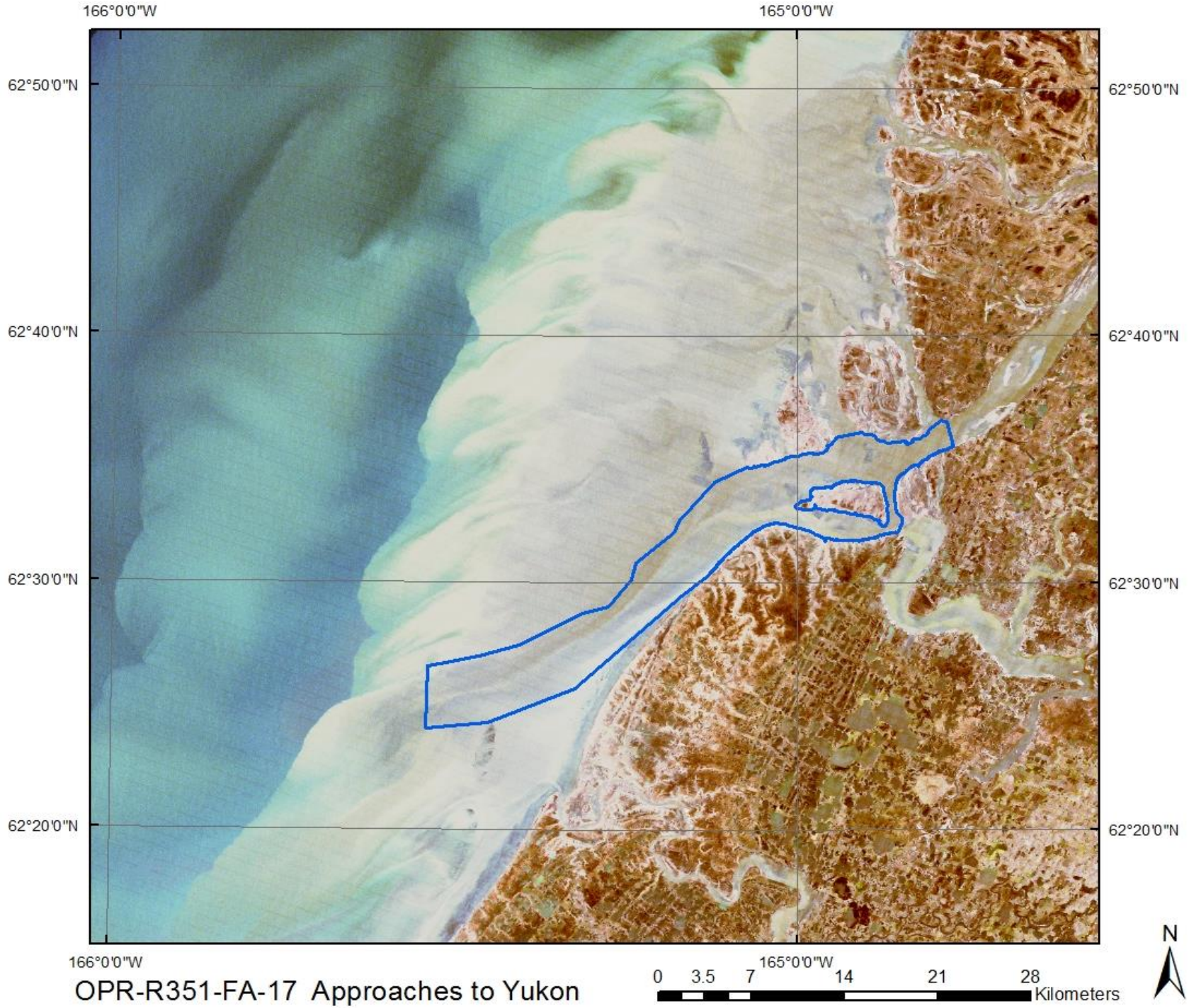




Satellite Visual Comparison

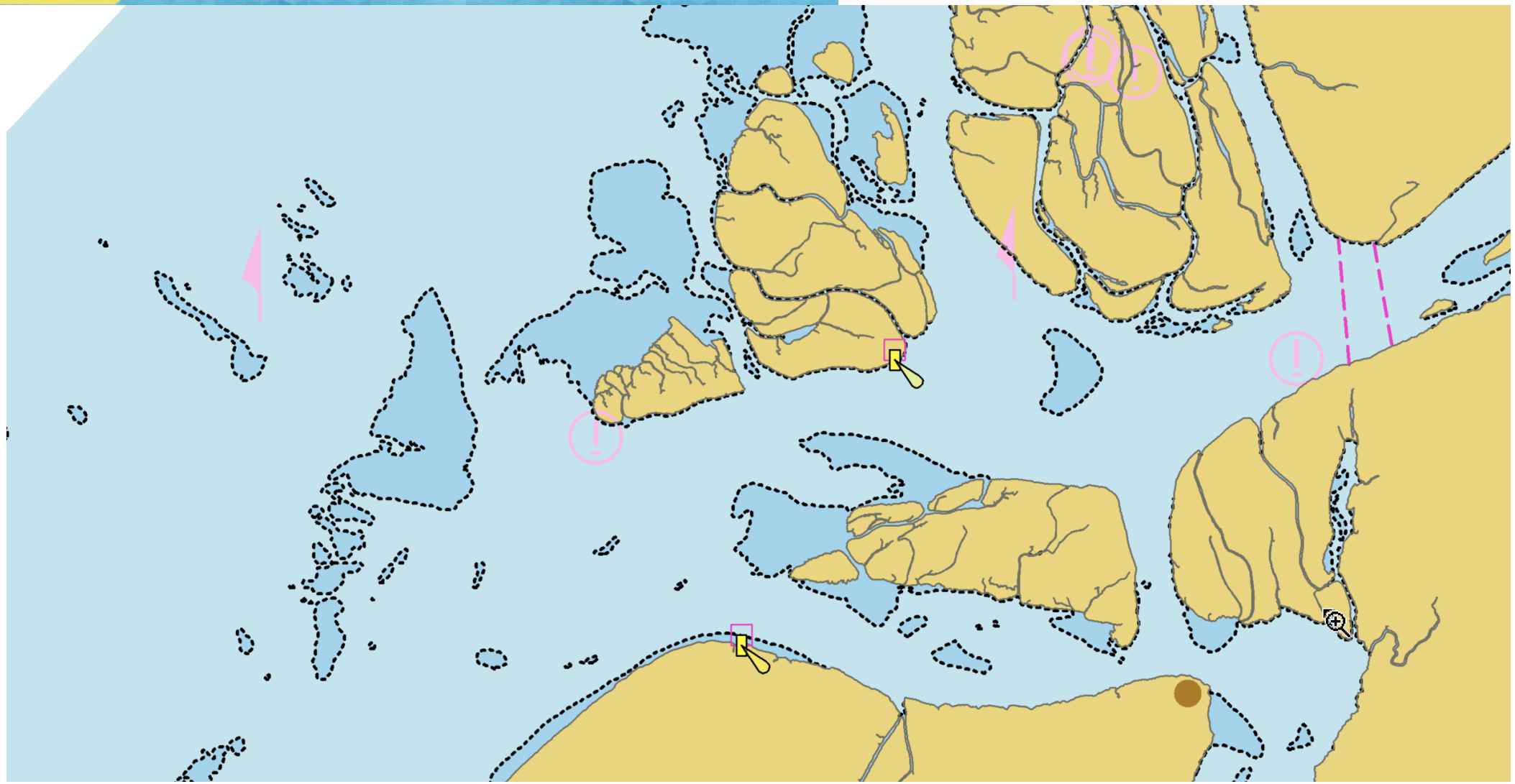


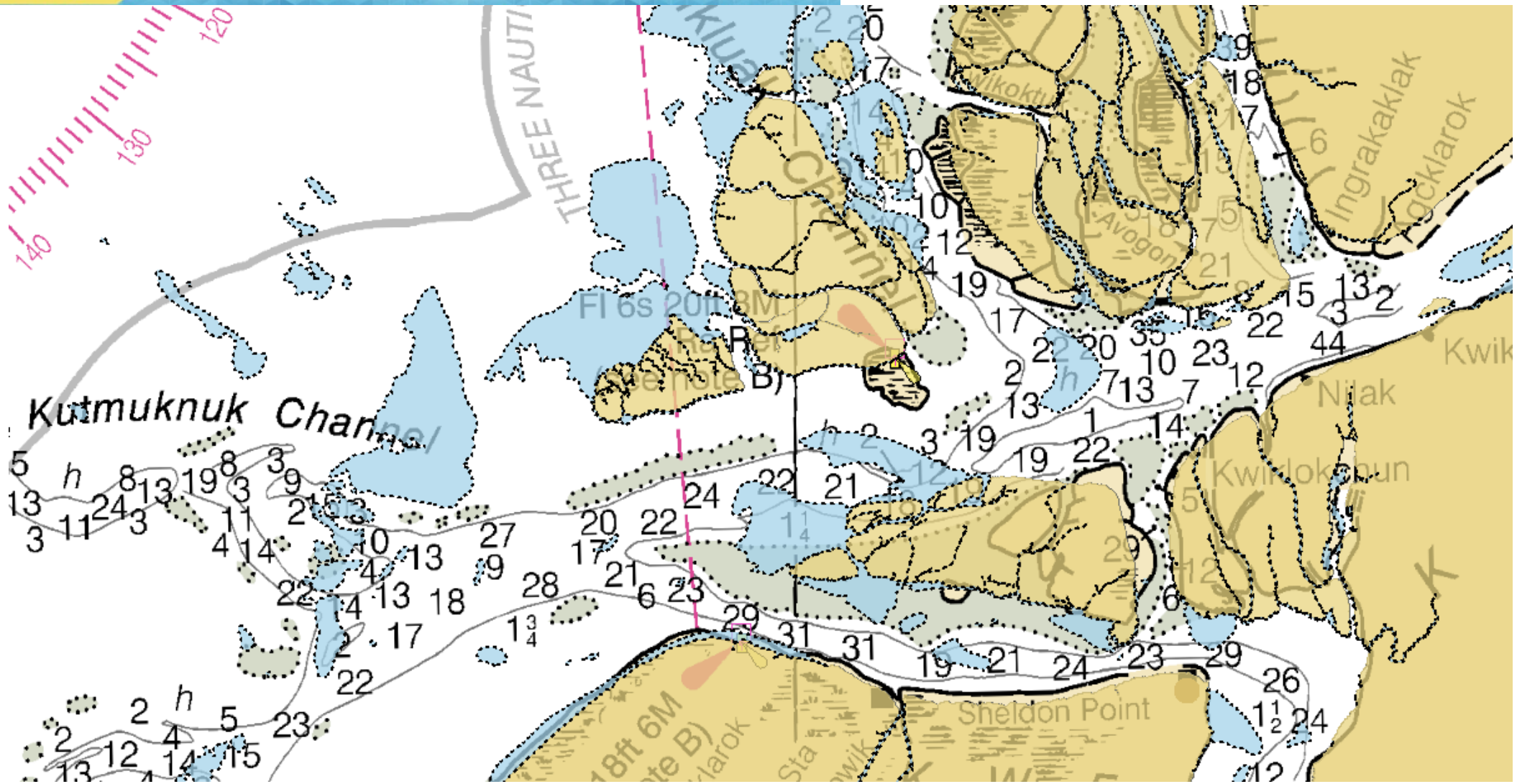

Kutmuknuk Channel
Taku Channel
Acharon Channel
Breakers
Nilak
Alakanuk



OPR-R351-FA-17 Approaches to Yukon

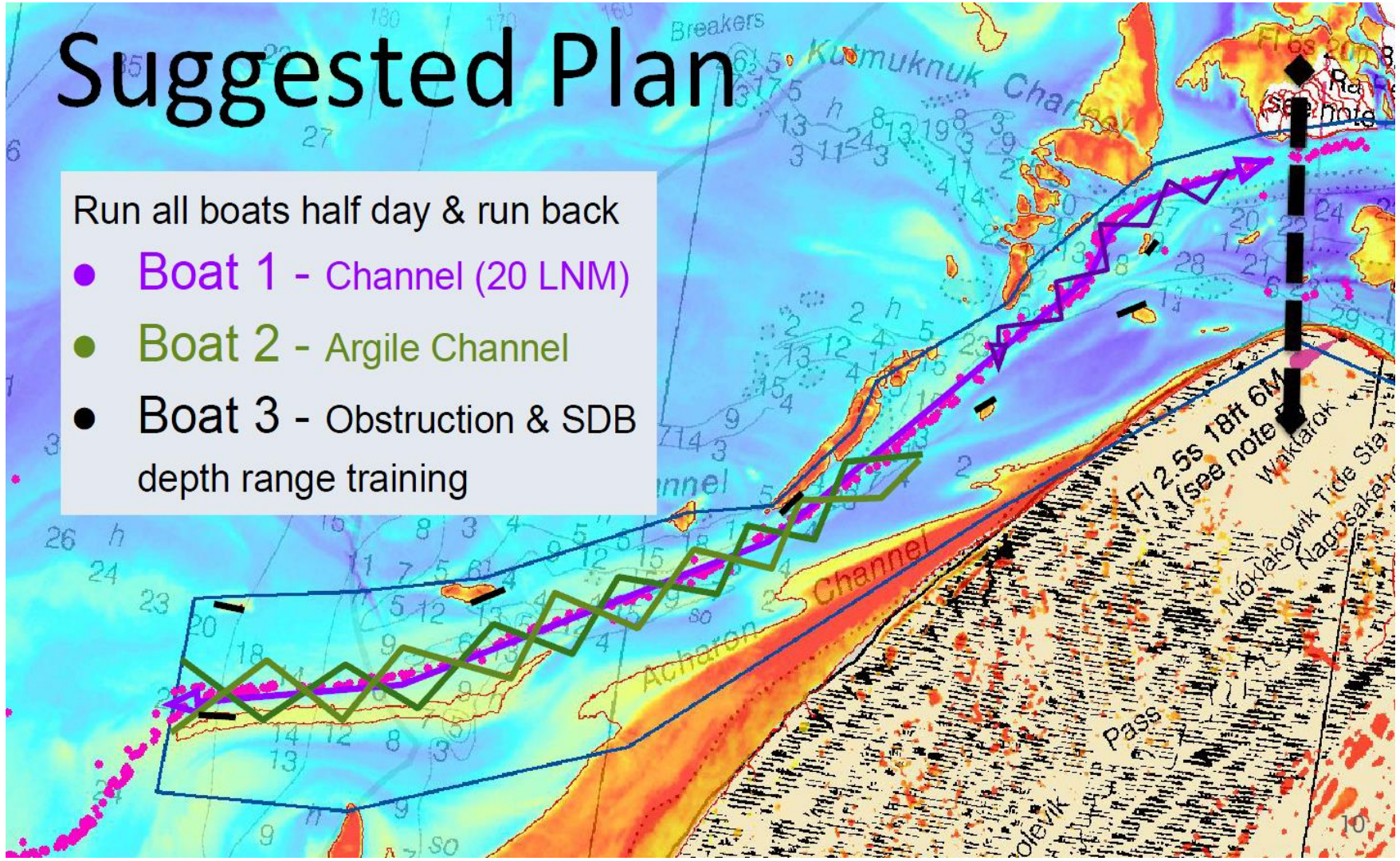
Charted SDB Shoals

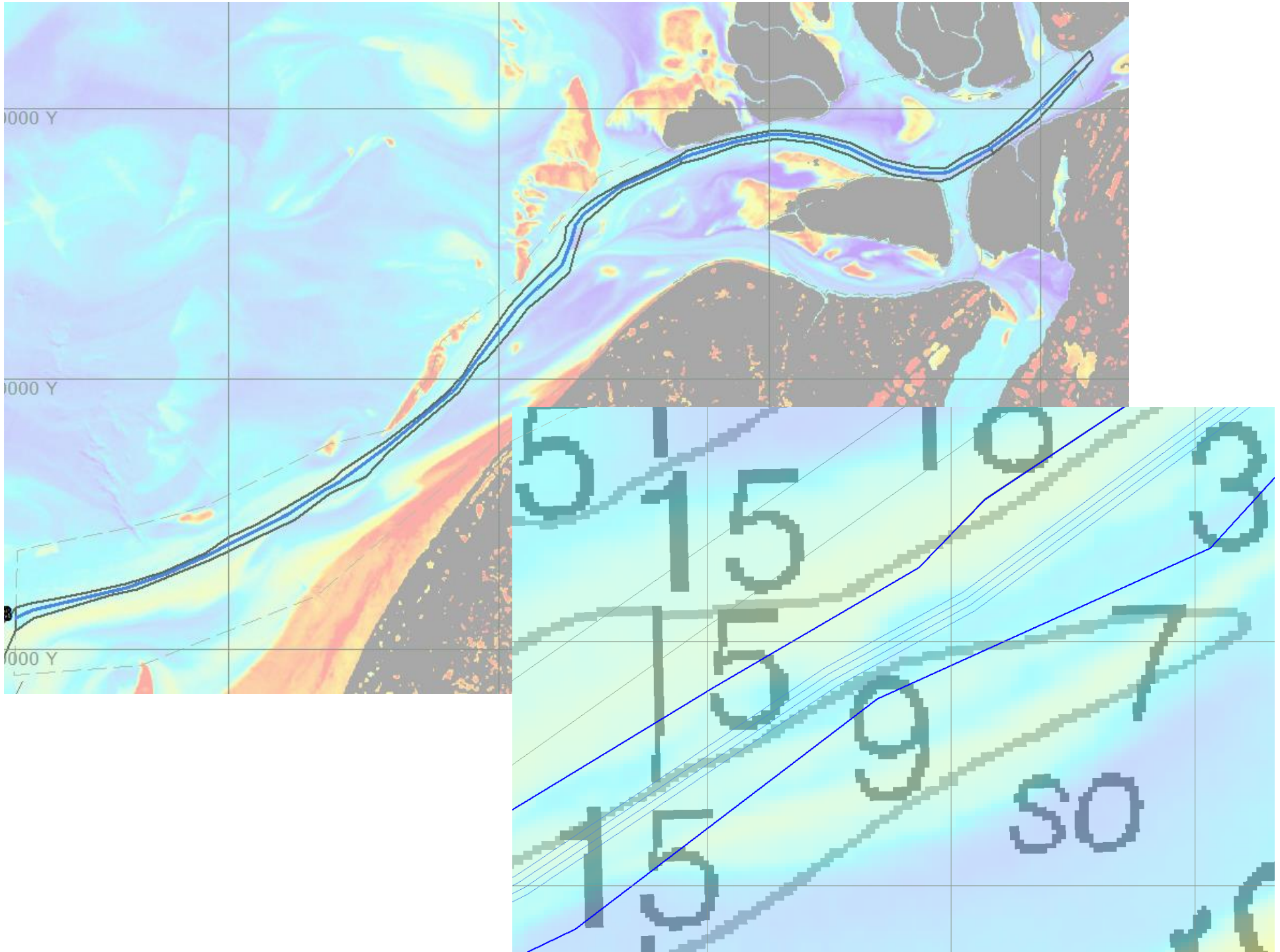



THREE NAUTI
Kutmuknuk Chan
Fl 6s 20ft 8M
Sheldon Point
Ingrakaklak
Kwik
Nilak

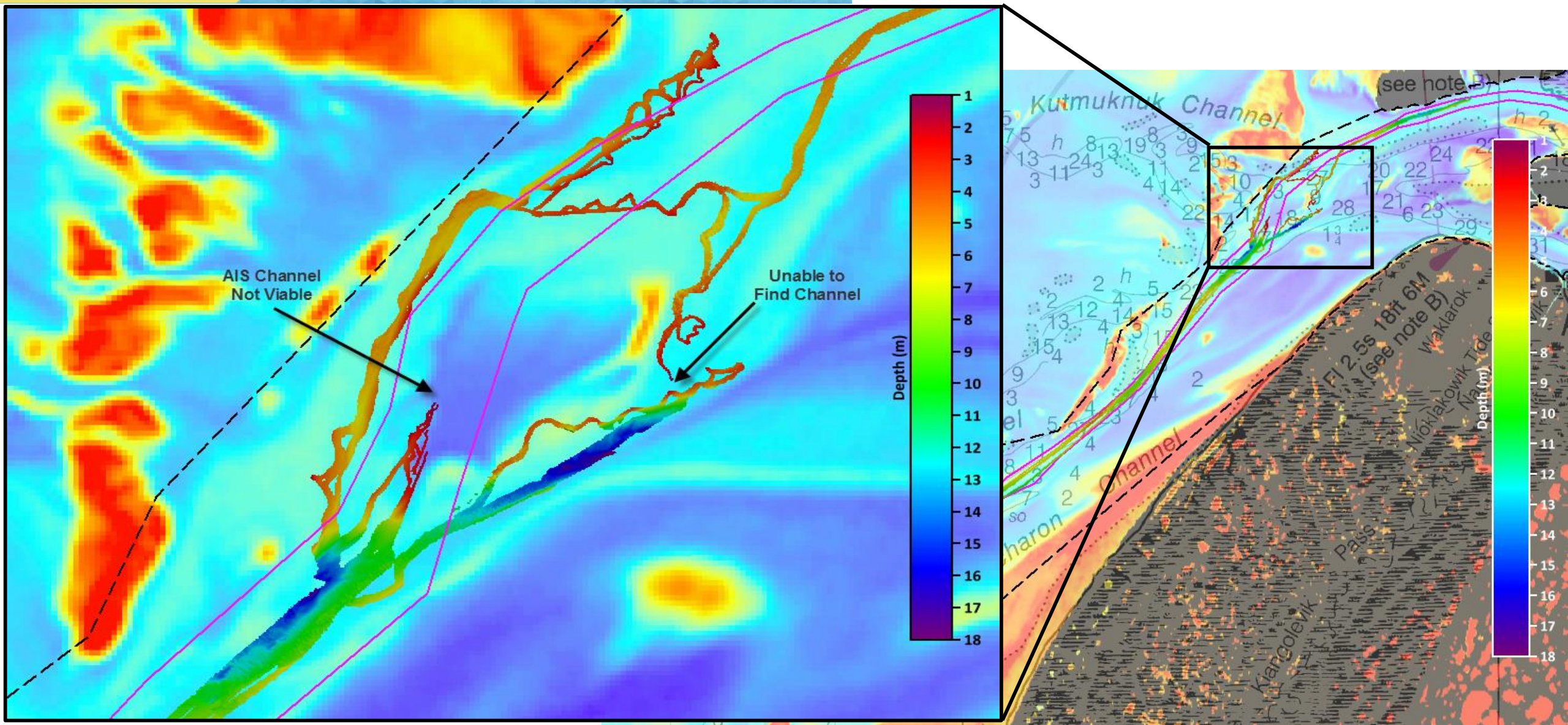
Survey Vessels

Initial Plan




0000 Y
0000 Y
0000 Y
515 10 3
15 9 7
so

July 11 Investigation

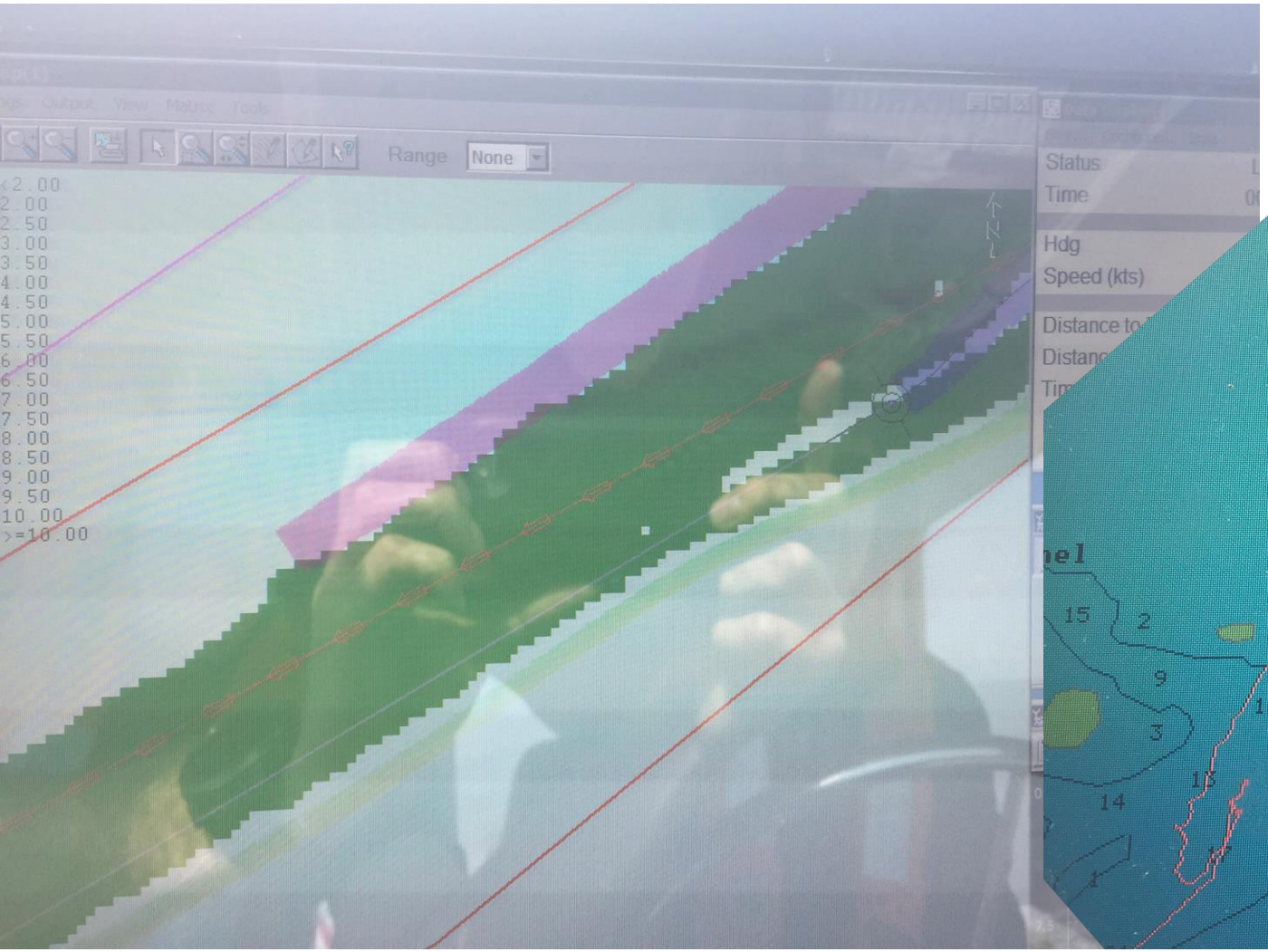


On the water

CHC-NSC 2018

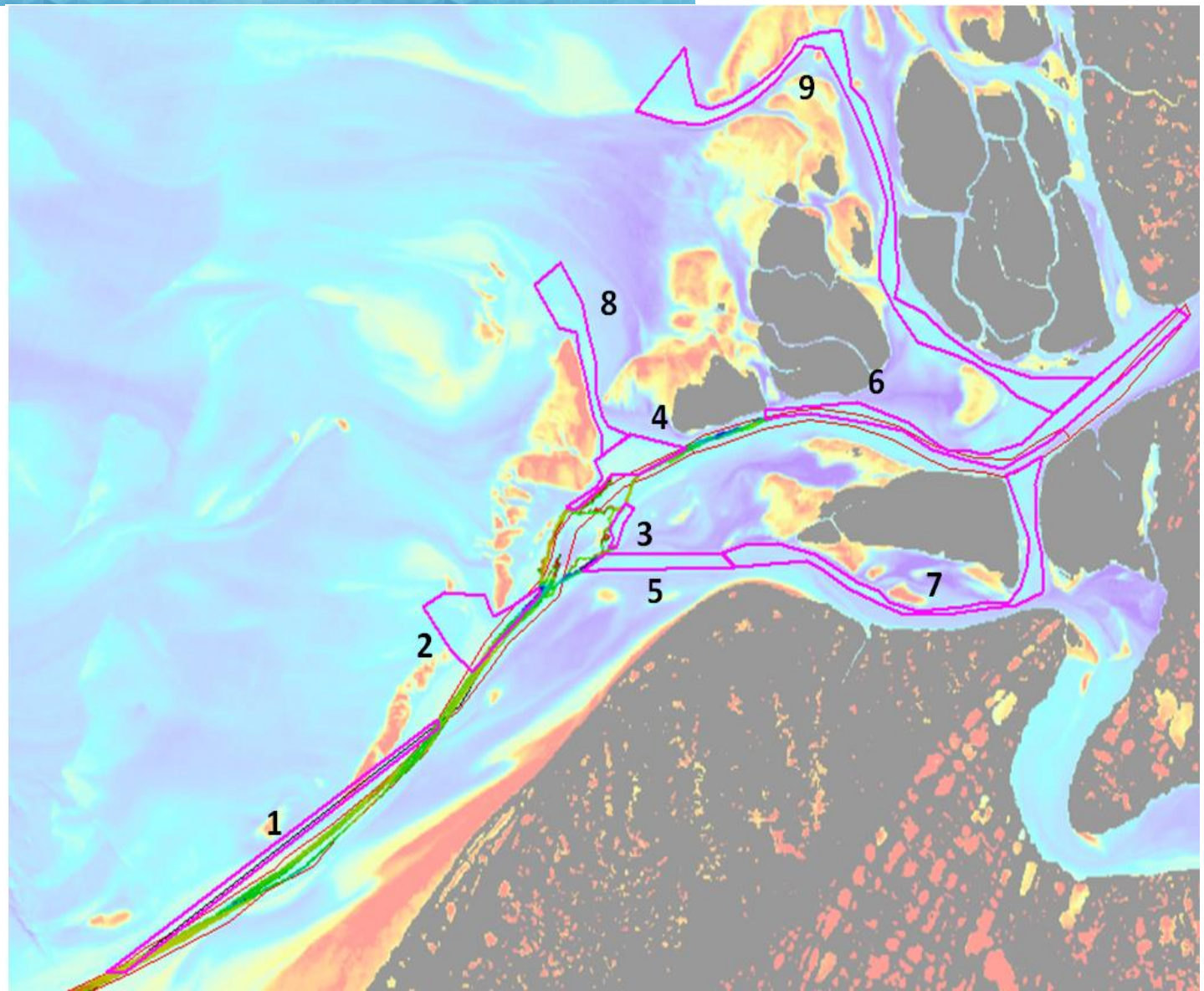
www.chc-nsc2018.ca

Field Techniques



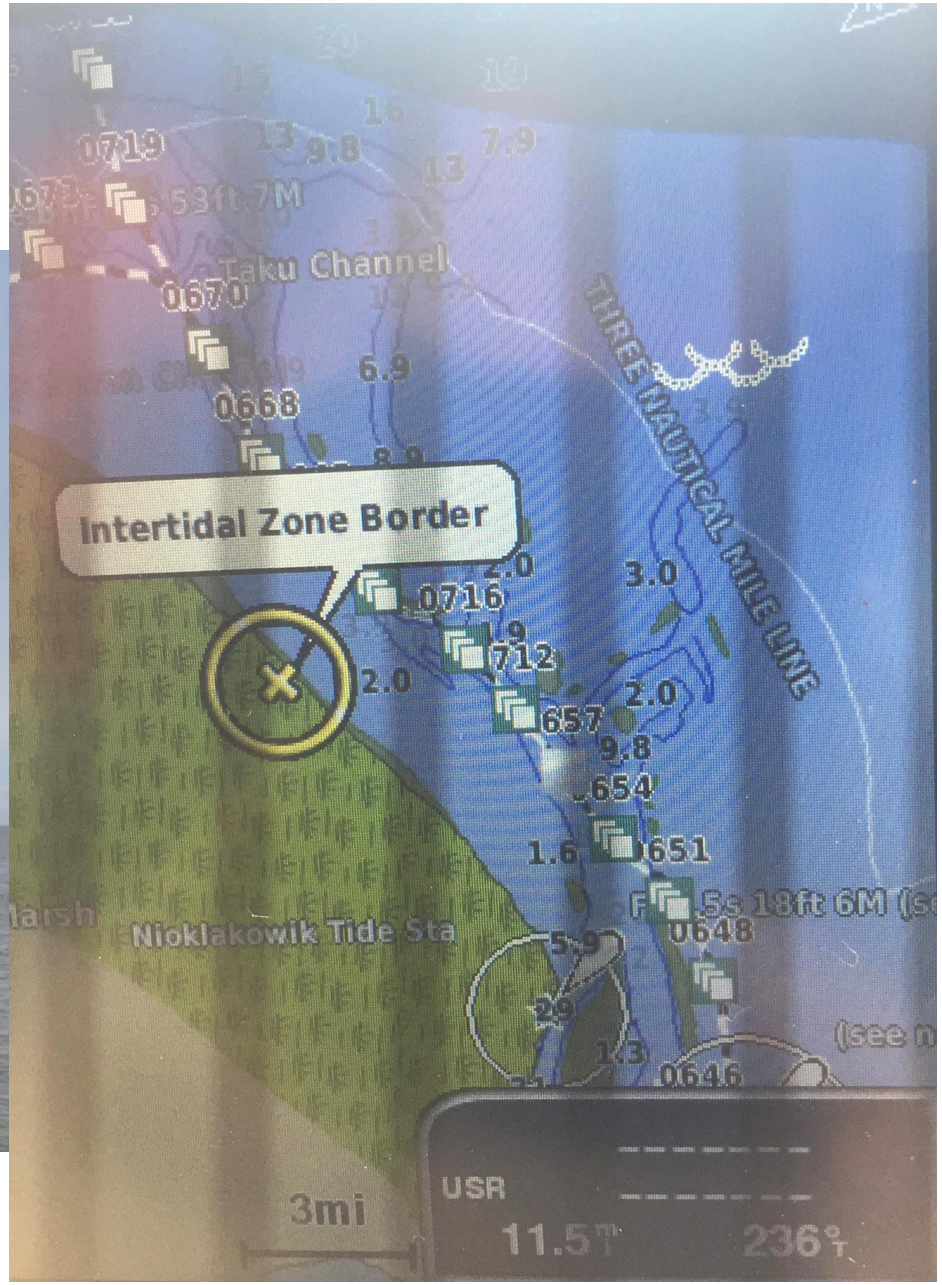
#chcnsc2018

July 12 Planning

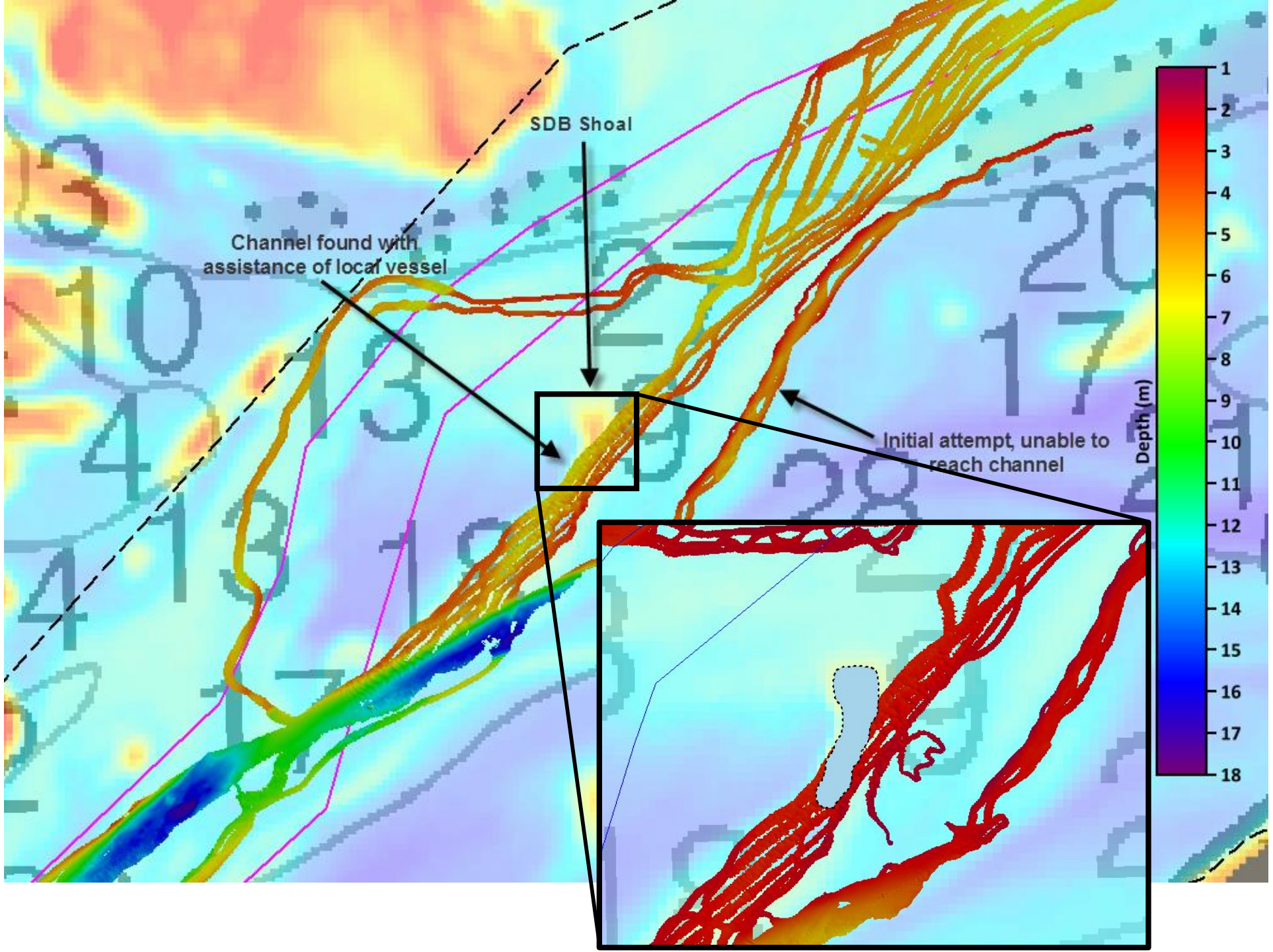


CHC-NSC 2018

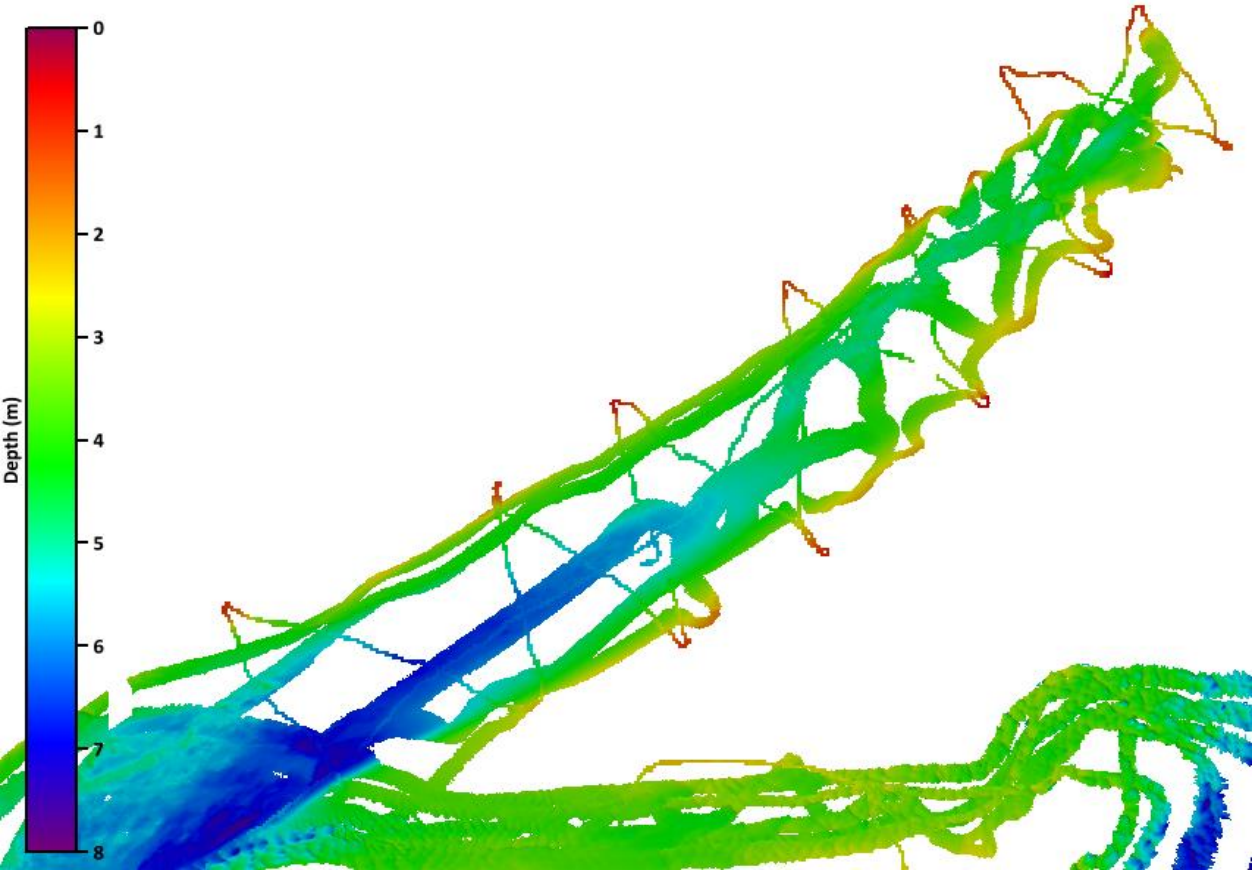
www.chc-nsc2018.ca

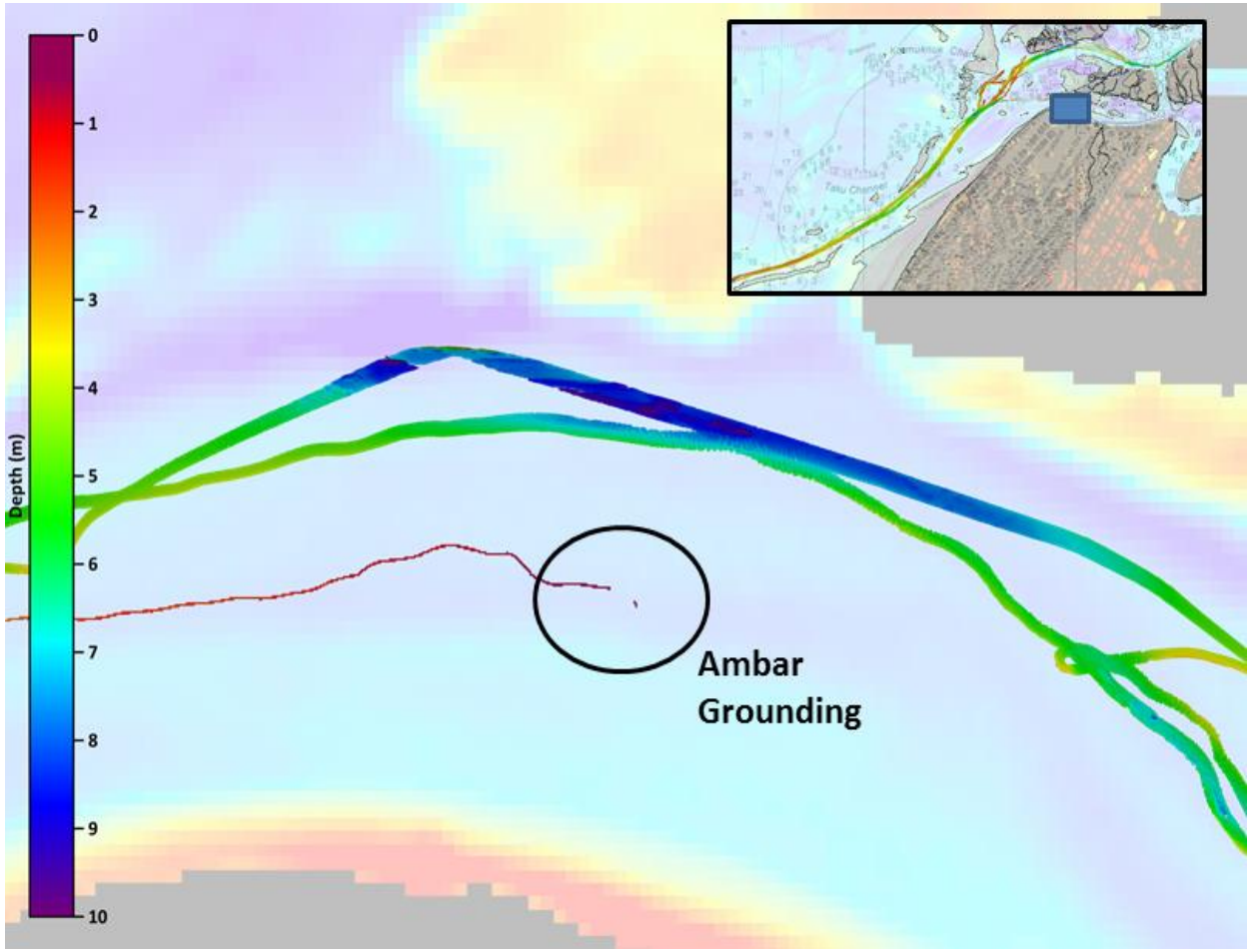


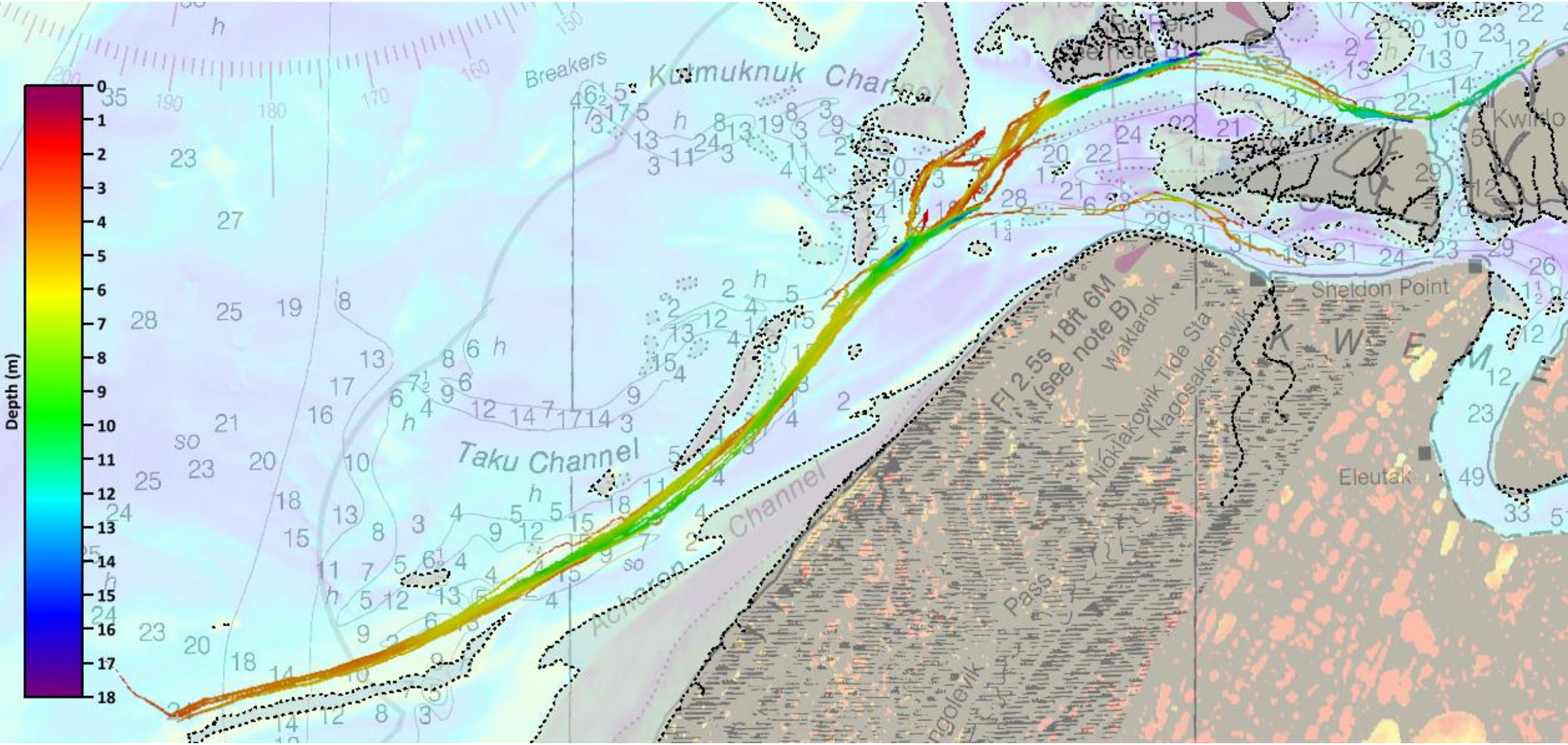
#chcnsc2018


SDB Shoal
Channel found with assistance of local vessel
Initial attempt, unable to reach channel
Depth (m)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18

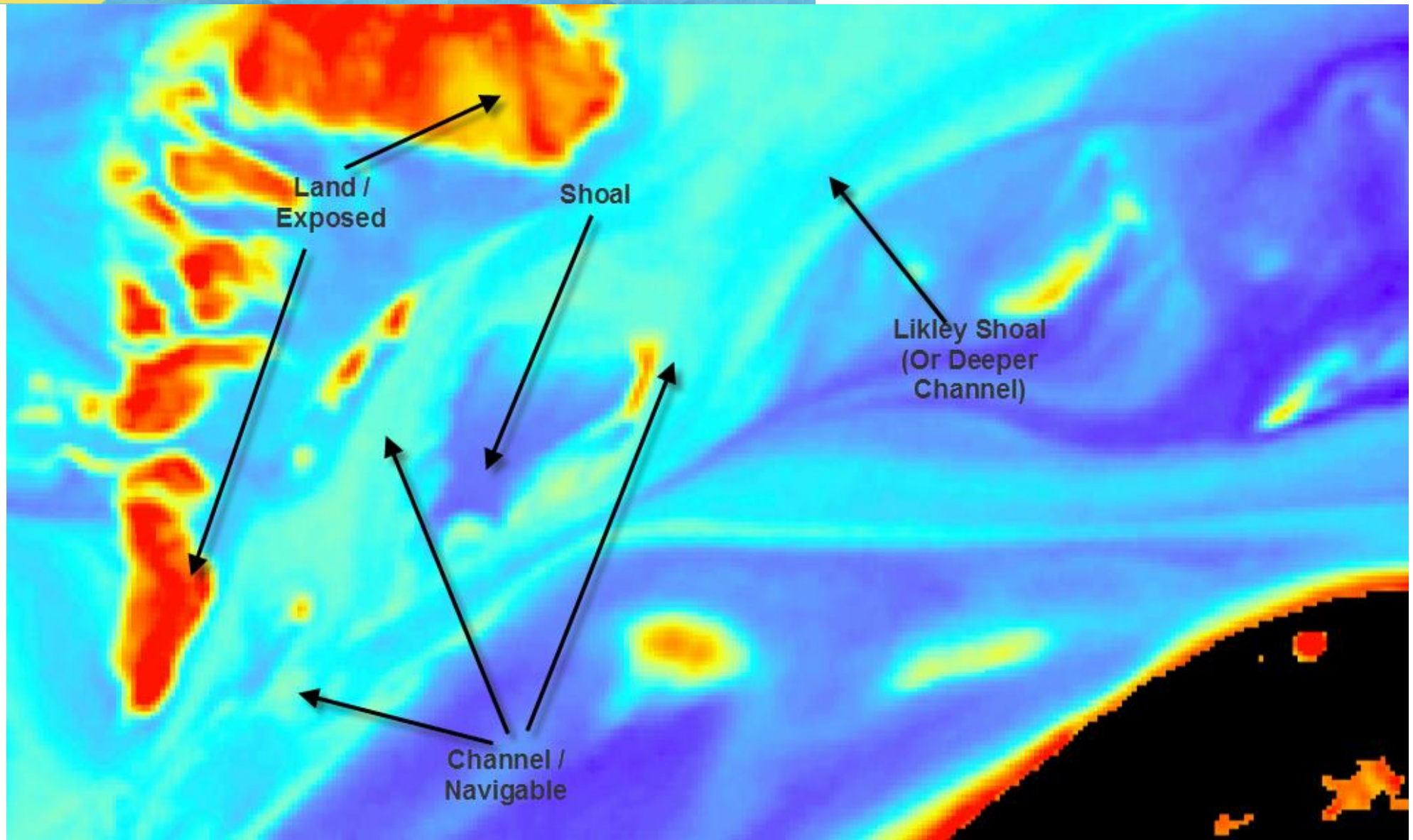
September 3 Investigation






Depth (m)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
Breakers
Kuimuknuk Channel
Taku Channel
Achorage Channel
Fl 2.5s 18ft 6M
(see note B)
Waklarok
Niokiakowik
Nagosakehowik
Tide Sta
Sheldon Point
Eleutak
Pass

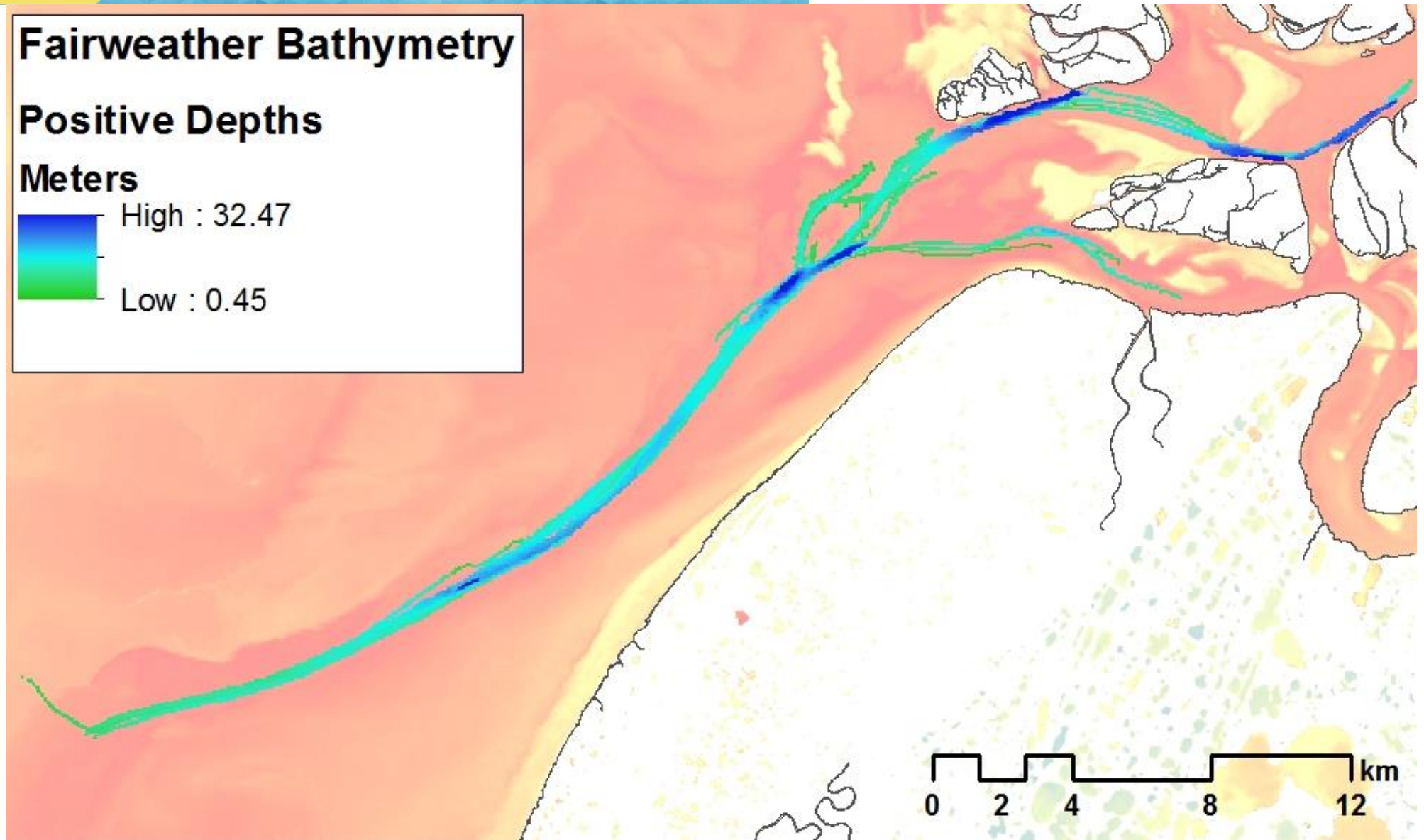
Qualitative Results

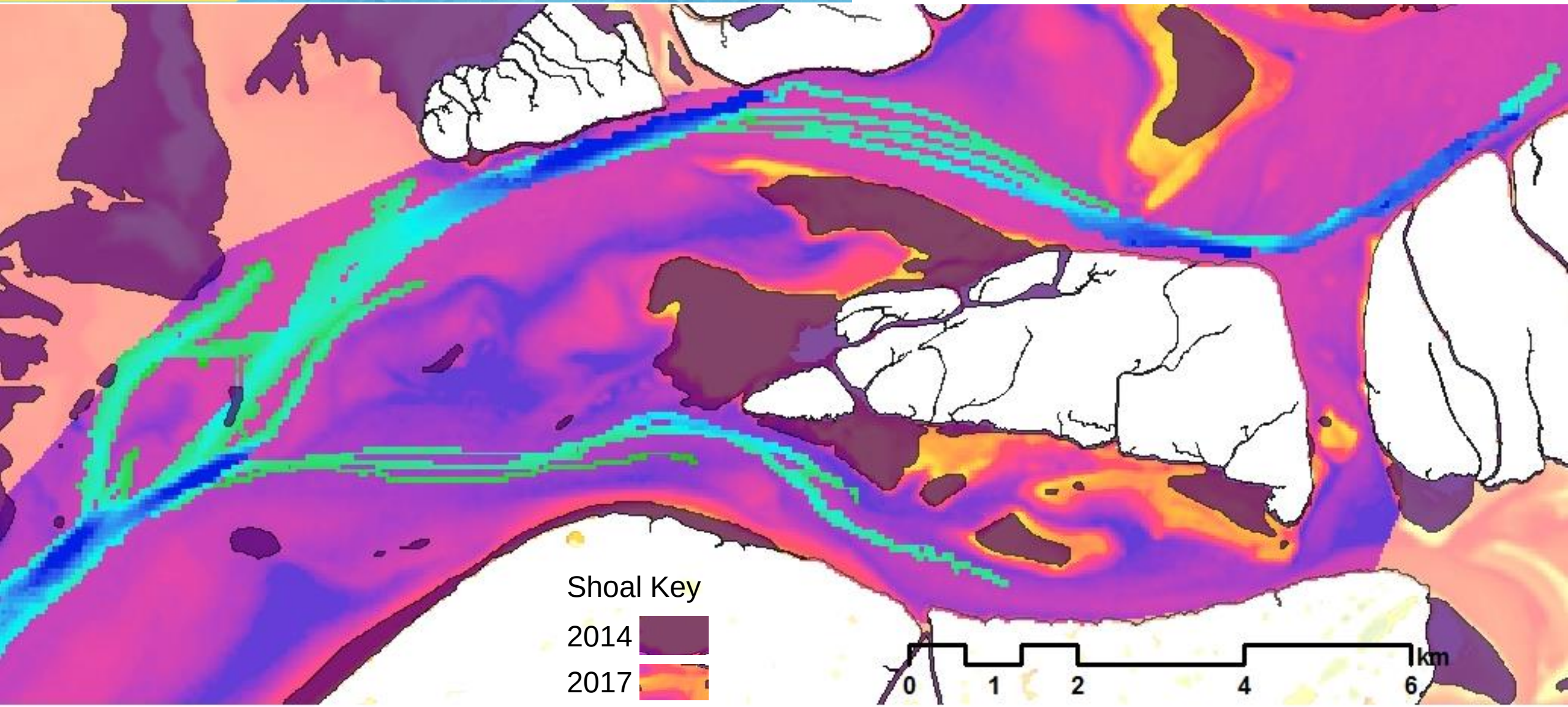


Field Operation Lessons

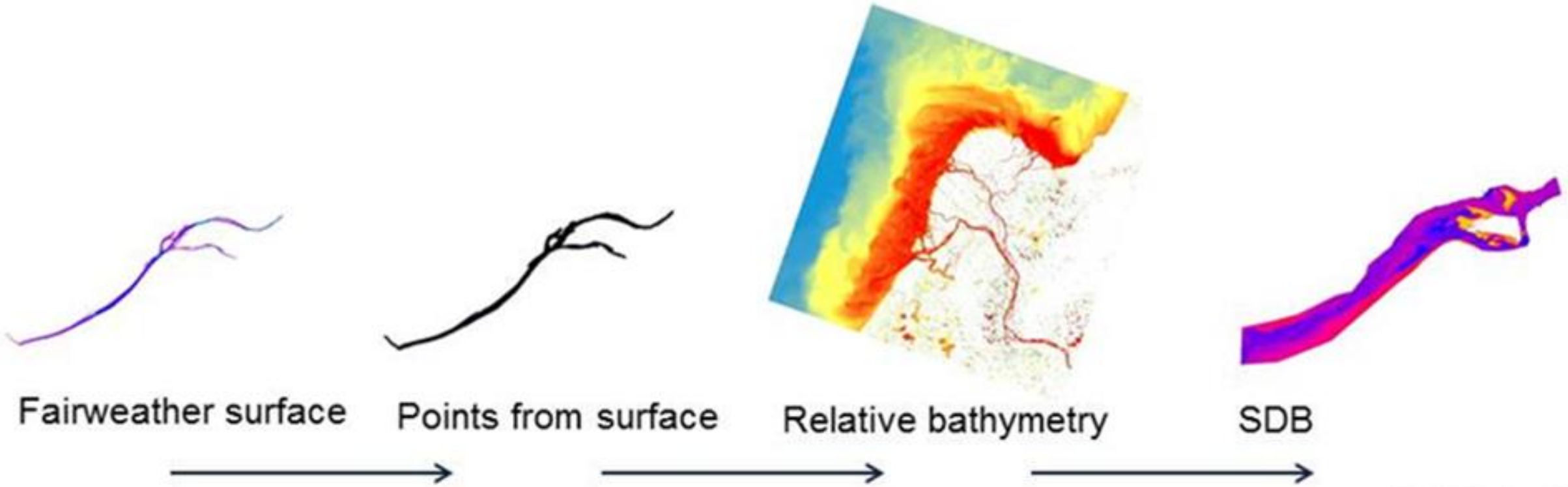
- Local knowledge is key to success in remote, variable regions
  - Knowledge of vessel routes can guide unknown waterways
- Satellite derived bathymetry can be used as a guide
  - It is most effective when recent in dynamic areas
- Visual navigation is difficult in the field
- An MBES can be more effective than single beam for shallow water exploration

Satellite Derived Bathymetry Analysis

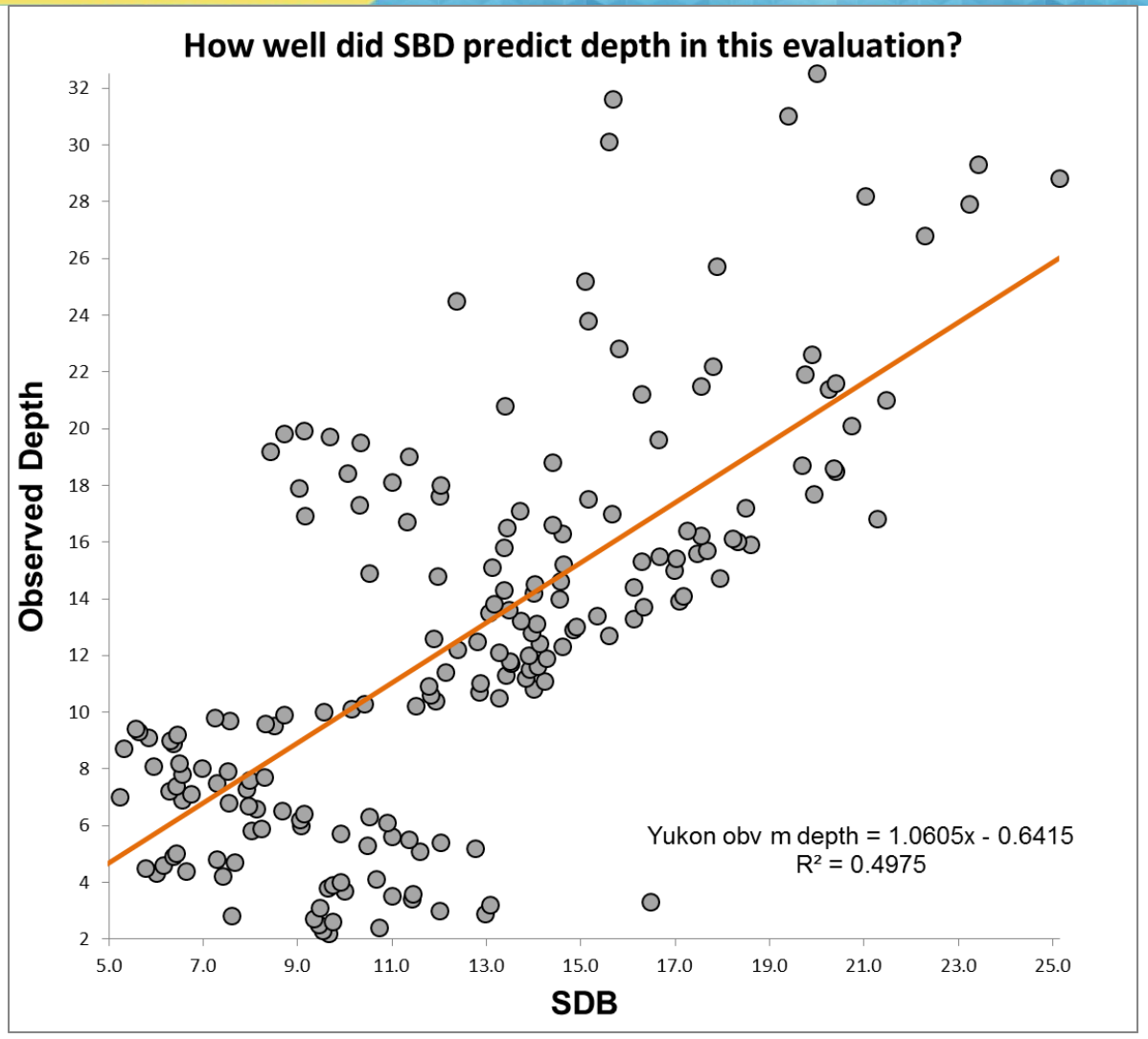

Fairweather Bathymetry
Positive Depths
Meters
High : 32.47
Low : 0.45
0
2
4
8
12
km

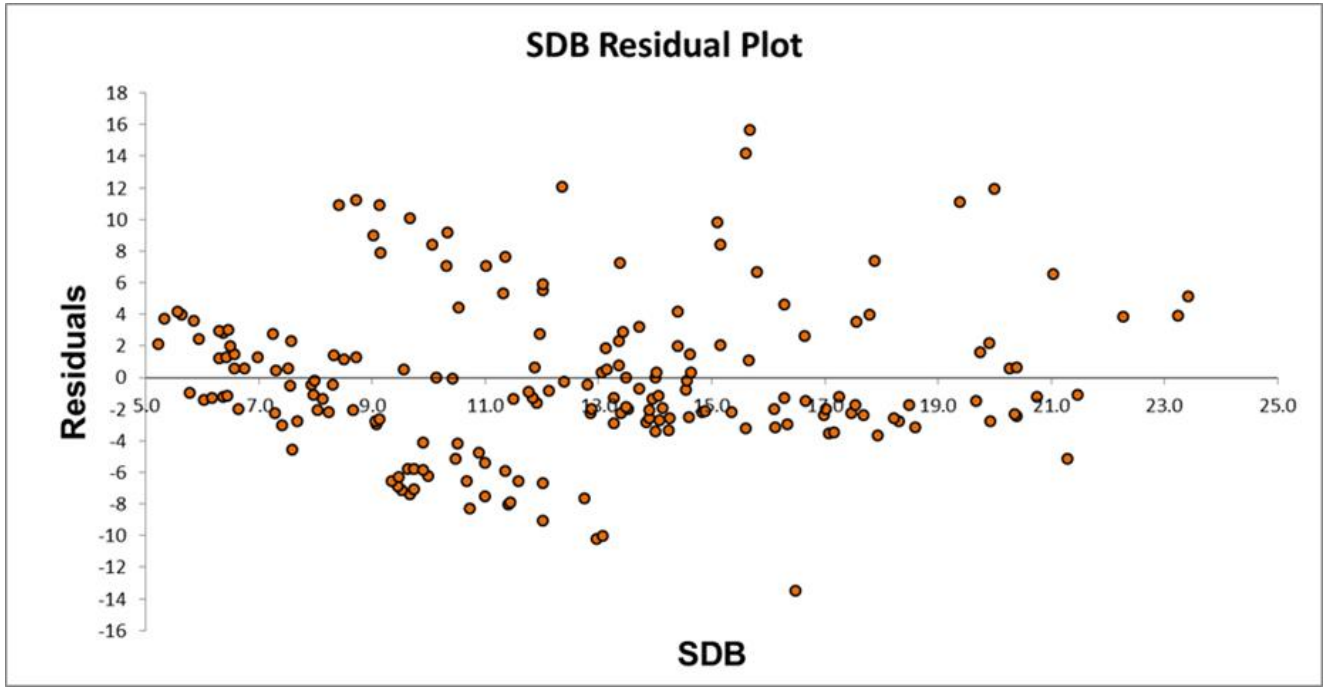

Shoal Key
2014
2017
0
1
2
4
6
km

SDB Calibration

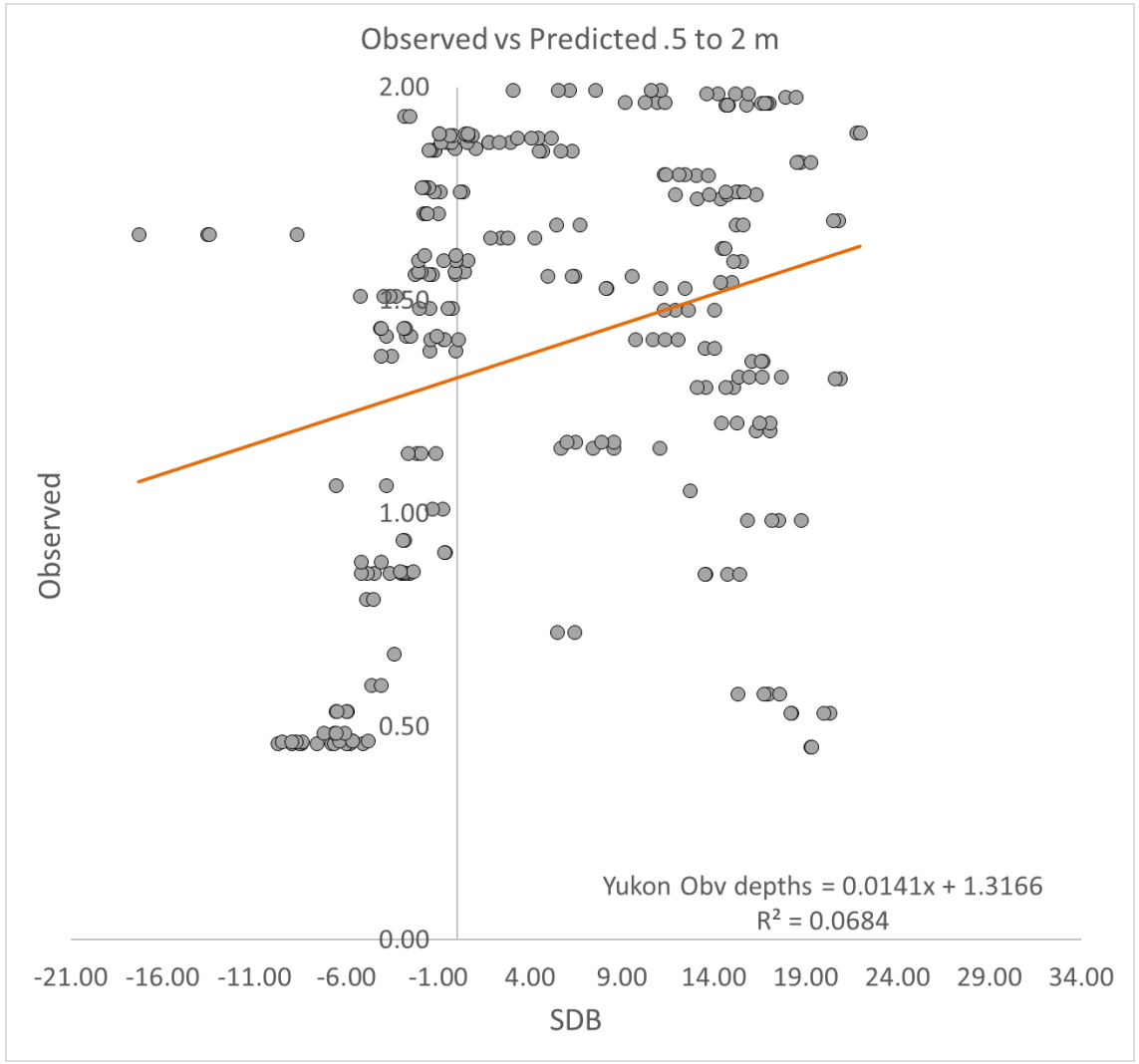


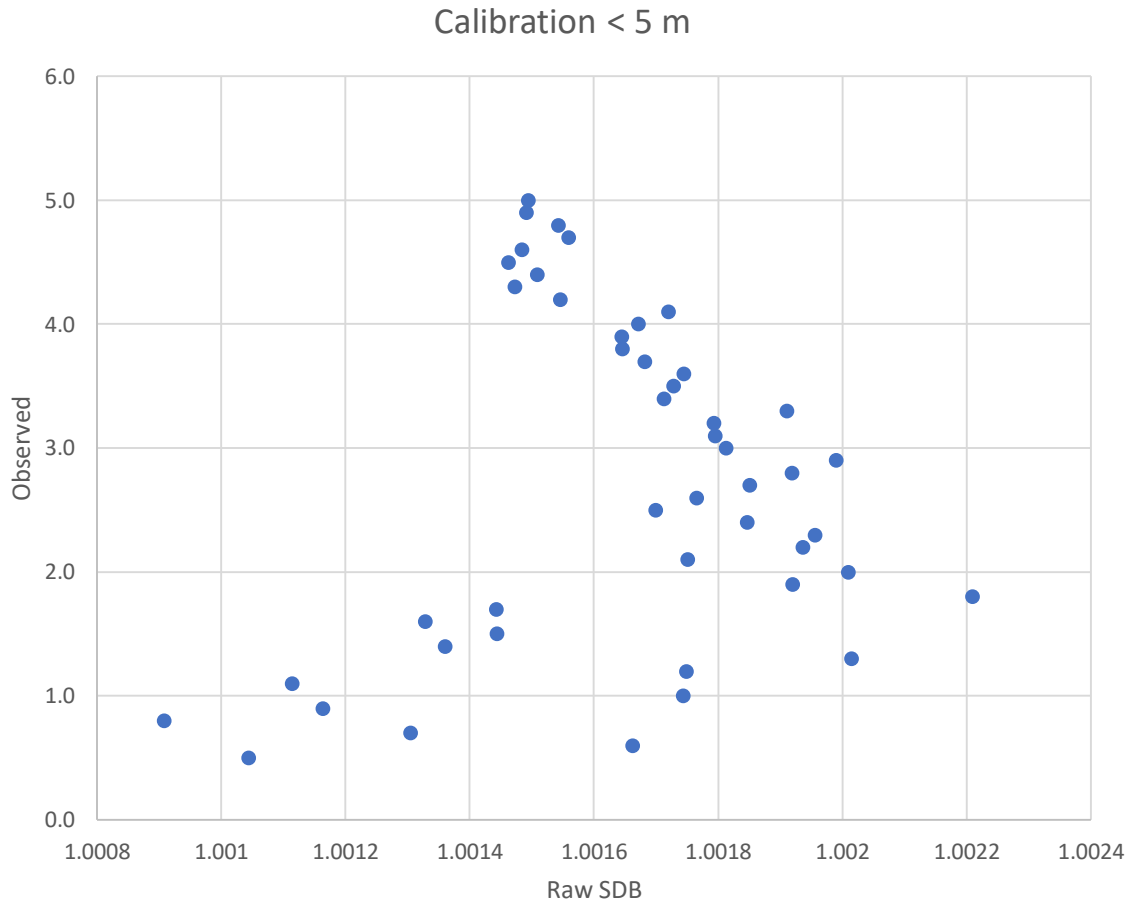
SDB Comparison



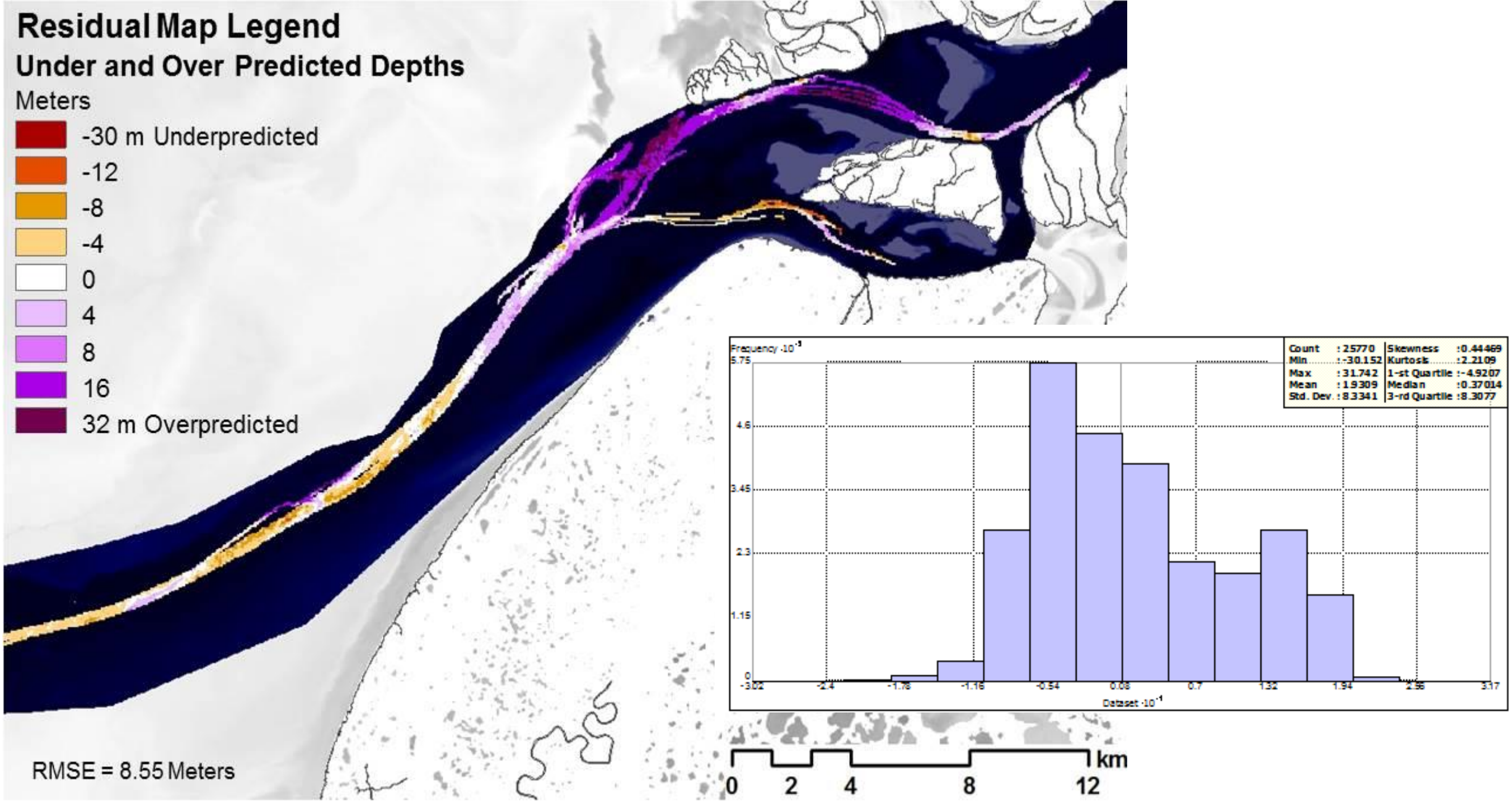


#chcnsc2018

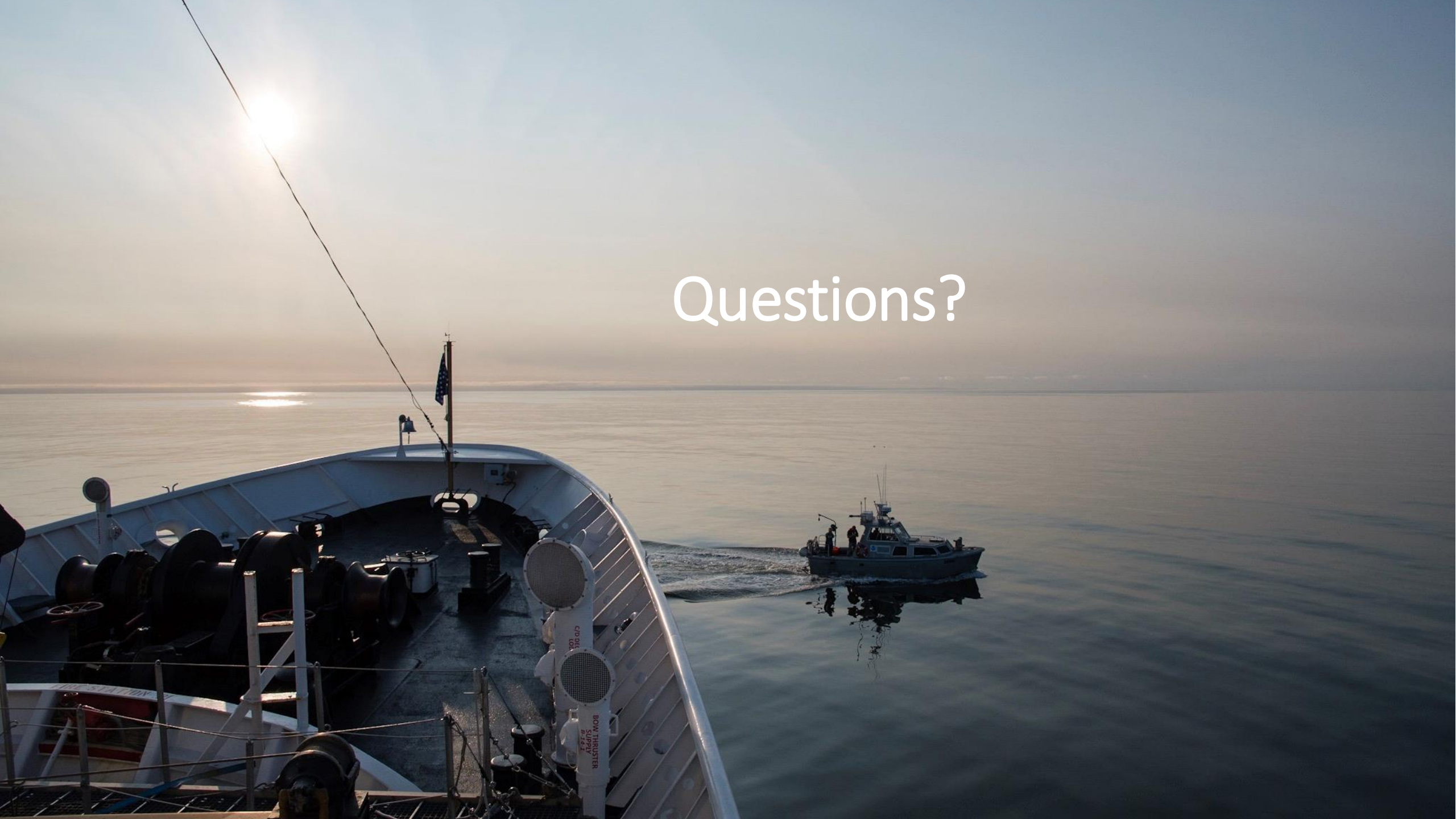

Observed vs Predicted .5 to 2 m
2.00
1.50
1.00
0.50
0.00
Observed
-21.00 -16.00 -11.00 -6.00 -1.00 4.00 9.00 14.00 19.00 24.00 29.00 34.00
SDB
Yukon Obv depths = 0.0141x + 1.3166
R² = 0.0684

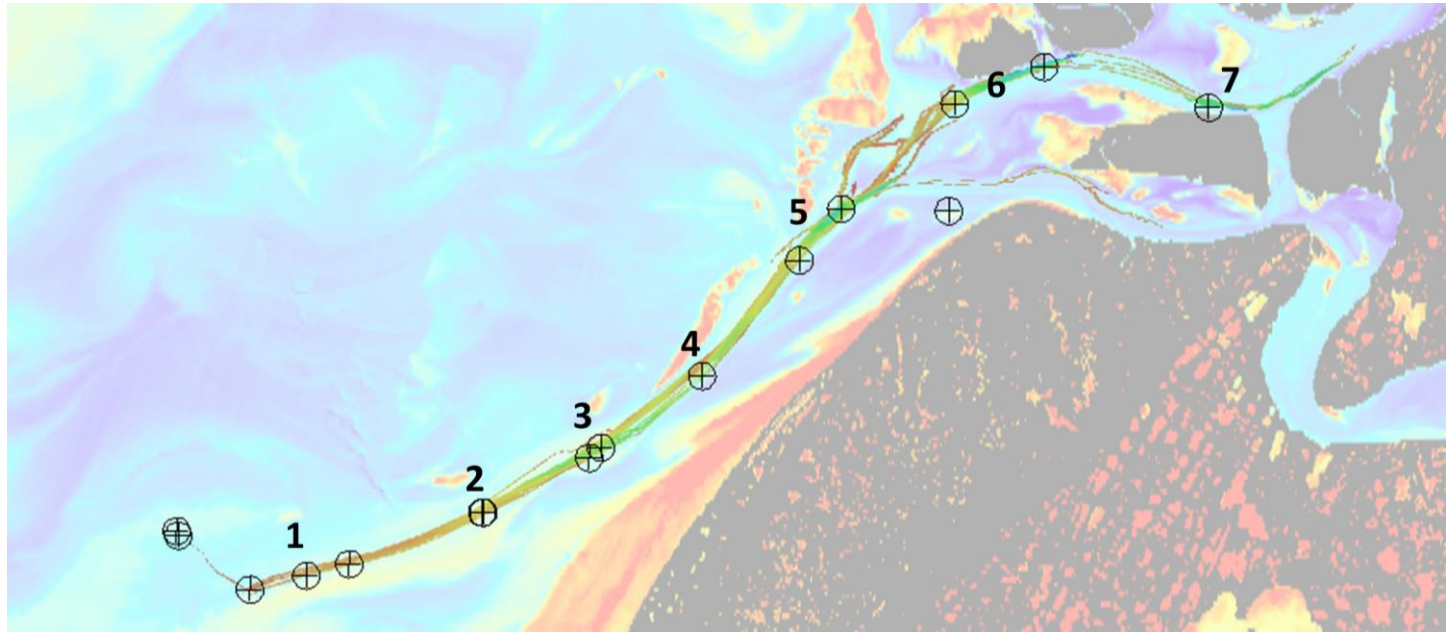

Calibration < 5 m
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Observed
1.0008 1.001 1.0012 1.0014 1.0016 1.0018 1.002 1.0022 1.0024
Raw SDB

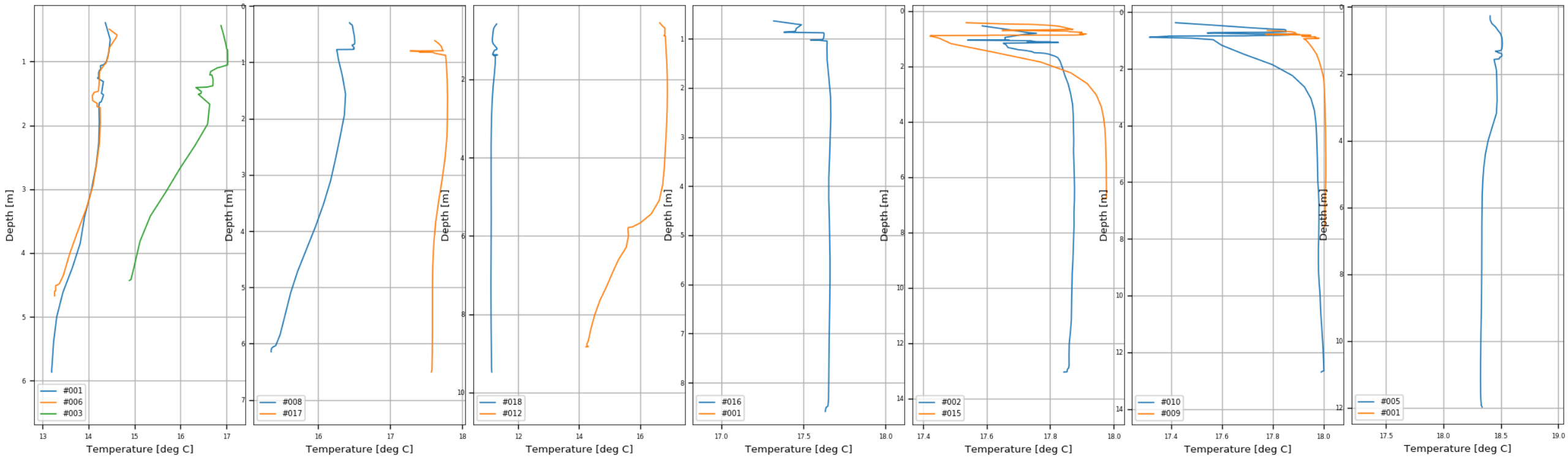
#chcnsc2018



Underpredicted positive meter depths are too shallow.
Overpredicted positive meter depths are too deep.


Questions?


1
2
3
4
5
6
7


Depth [m]
Temperature [deg C]
#001
#006
#003
#008
#017
#018
#012
#016
#001
#002
#015
#010
#009
#005
#001