Louisiana Shelf Dredge Pit Geophysical Studies

Kevin Xu

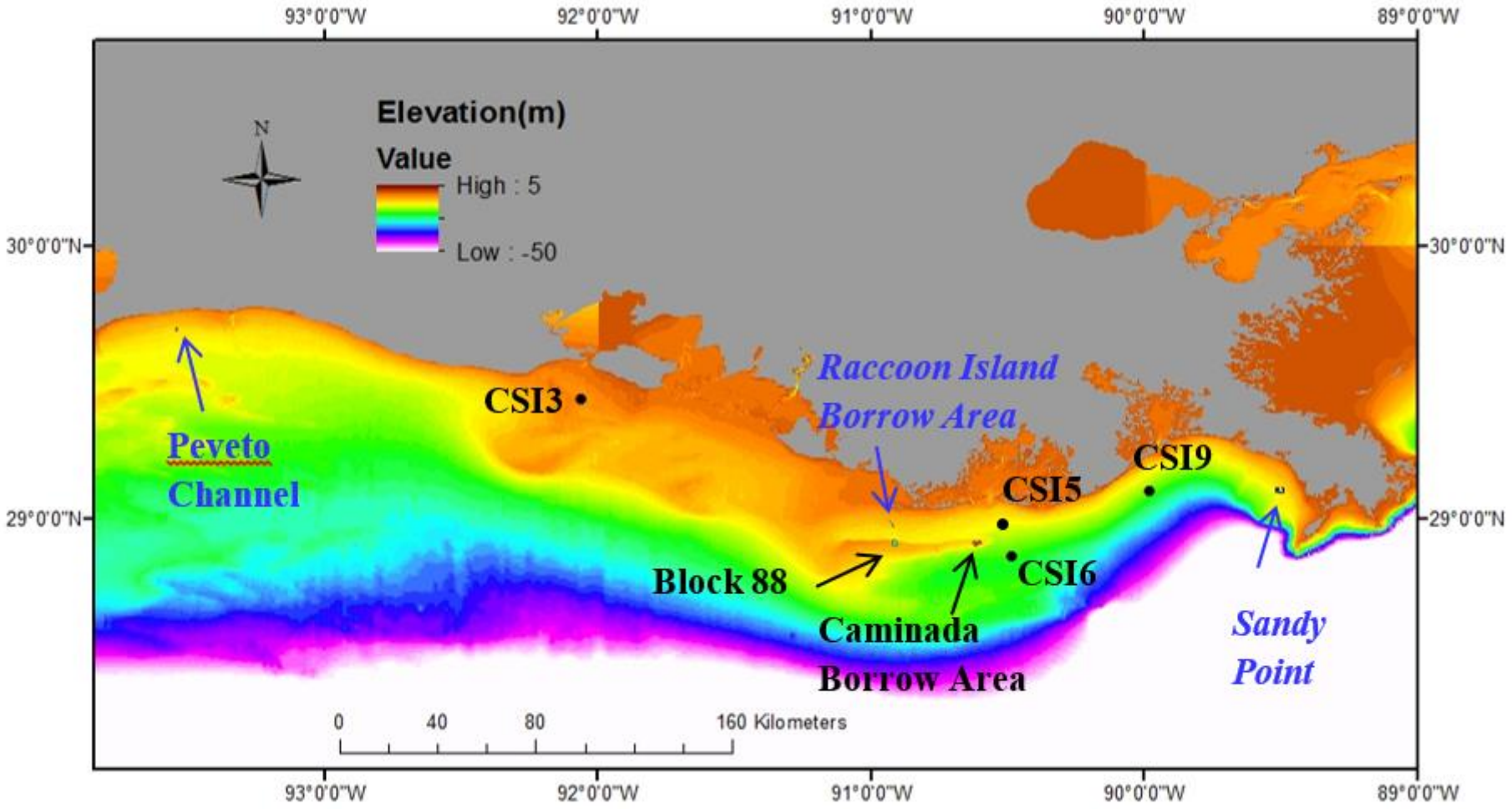
PI: Sam Bentley, Chunyan Li, Carol Wilson, George Xue, Kanchan Maiti, John White and Sibel Bargu

Students: **Jeffrey Obelcz, Jiaze Wang, Patrick Robichaux, Haoran Liu, Kelli Moran**, Nazanin Chaichitehrani, Meg O'Connor, Zehao Xue, Monique Boudreaux, Yanda Ou, Laura Thompson, Matthew Barley, Robert Bales

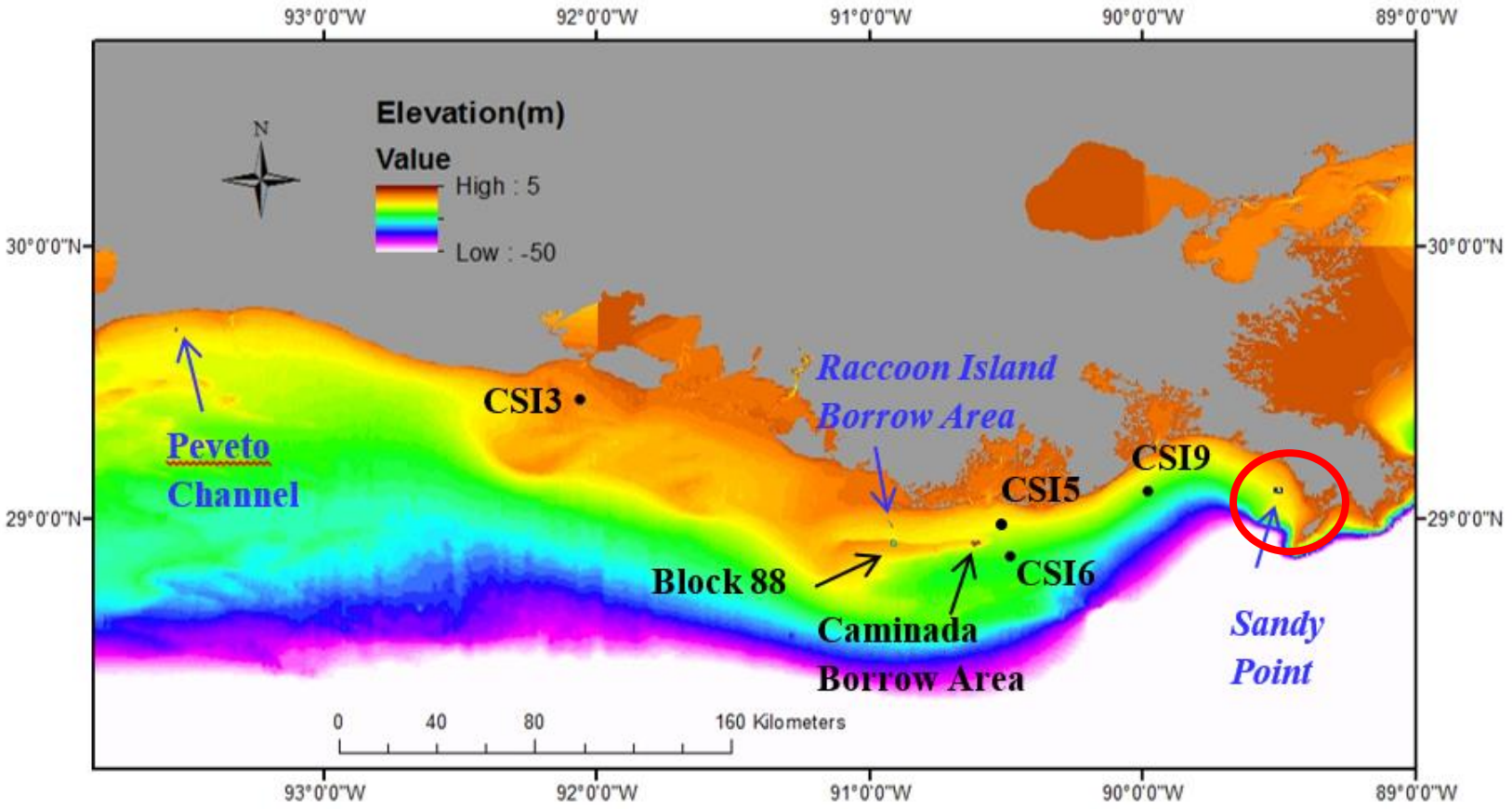
LSU | Coastal Studies Institute

BOEM Bureau of Ocean Energy Management

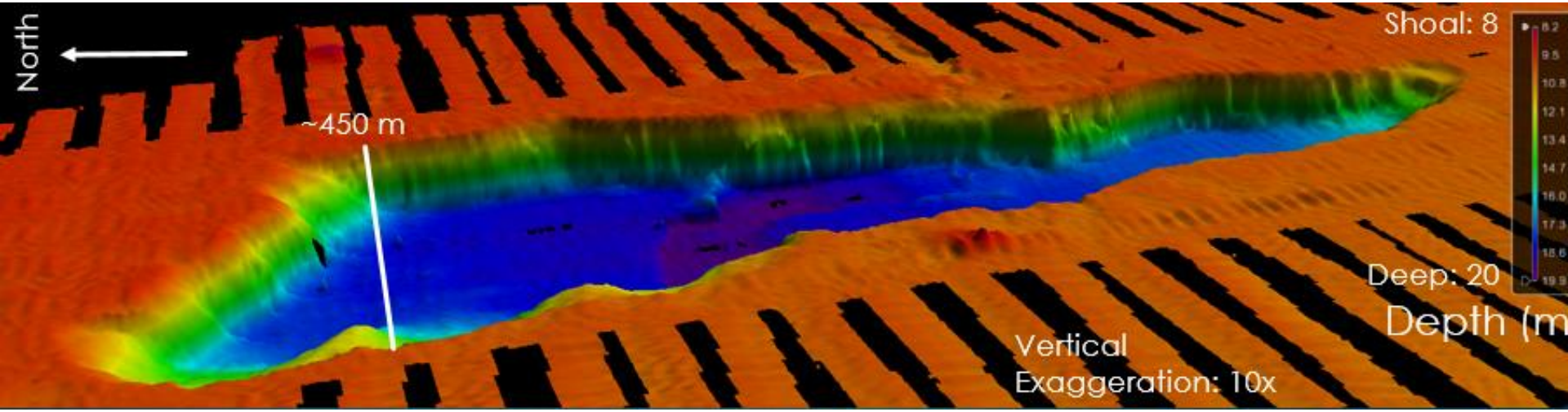
Paleo River Channel and Sandy Shoal Sites



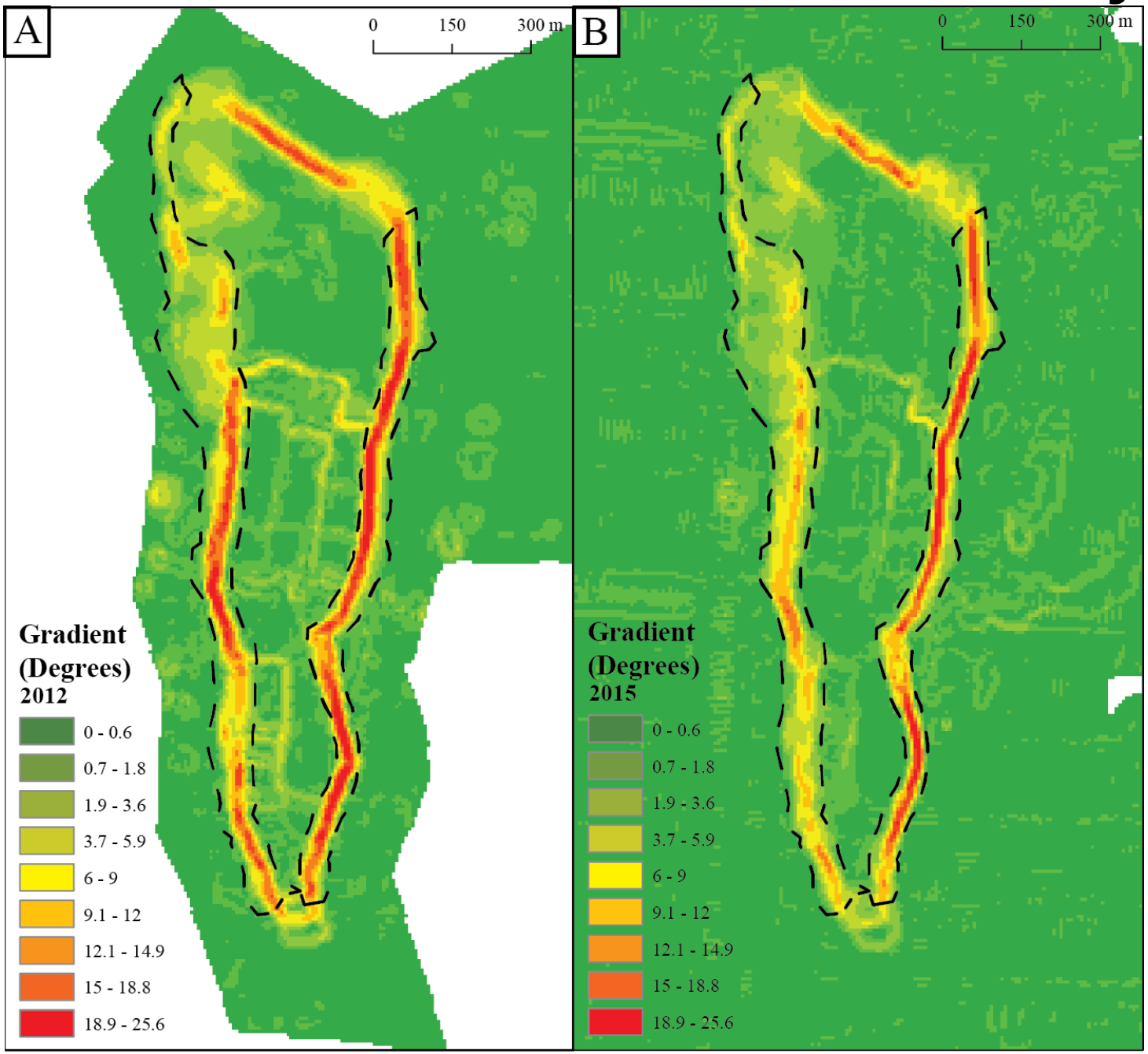
Sandy Point Dredge Pit
(east, paleo river channel)



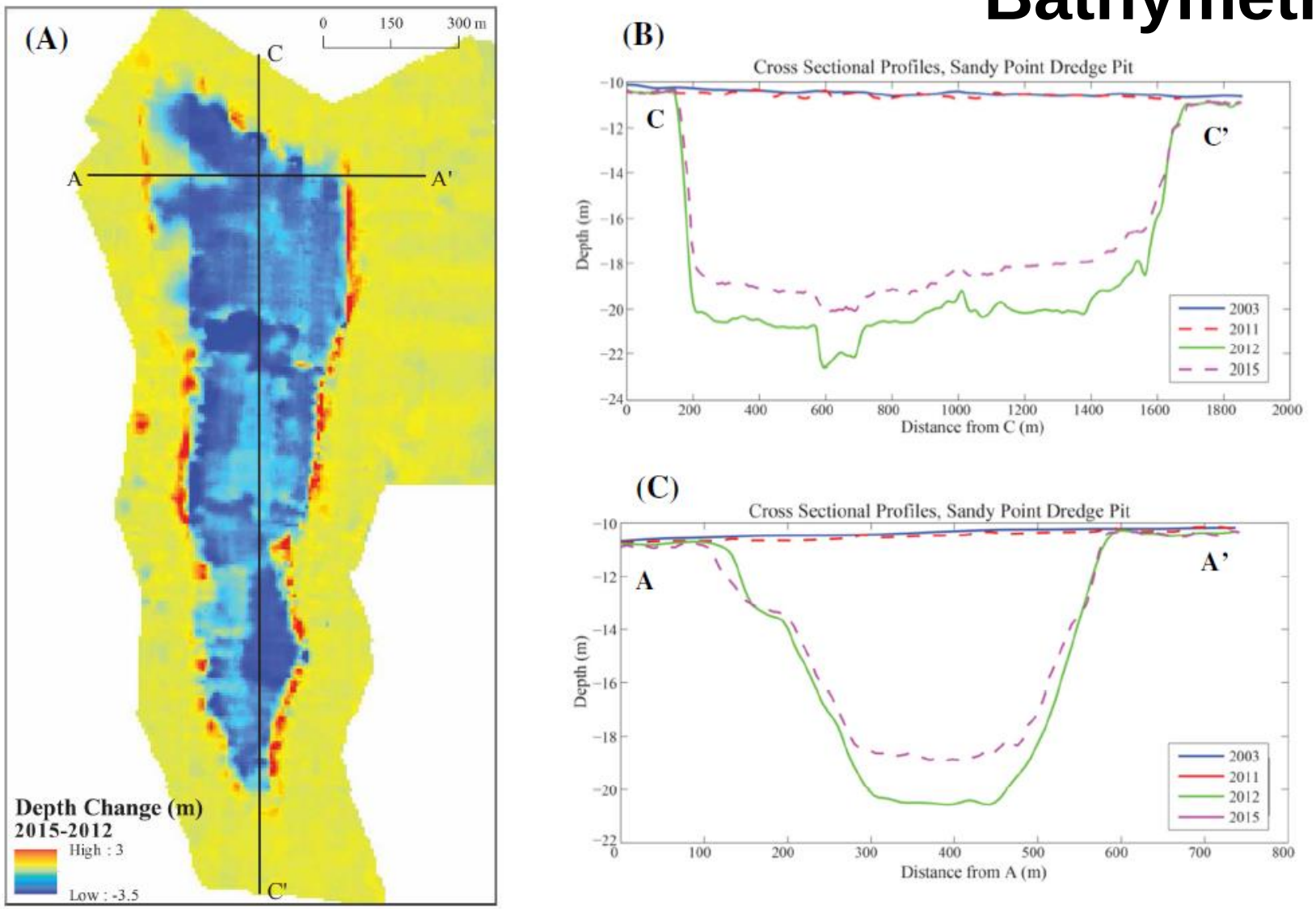
Bathymetry


North
~450 m
Shoal: 8
Deep: 20
Depth (m
Vertical
Exaggeration: 10x

Bathymetry


A
0
150
300 m
Gradient
(Degrees)
2012
0 - 0.6
0.7 - 1.8
1.9 - 3.6
3.7 - 5.9
6 - 9
9.1 - 12
12.1 - 14.9
15 - 18.8
18.9 - 25.6
B
0
150
300 m
Gradient
(Degrees)
2015
0 - 0.6
0.7 - 1.8
1.9 - 3.6
3.7 - 5.9
6 - 9
9.1 - 12
12.1 - 14.9
15 - 18.8
18.9 - 25.6

Bathymetry



(A) Differences of depths between 2012 and 2015 bathymetric data sets collected at Sandy Point dredge pit; (B) and (C), topographic profiles along A-A' and C-C' transects collected in 2003, 2011, 2012 and 2015, respectively.

ADCP

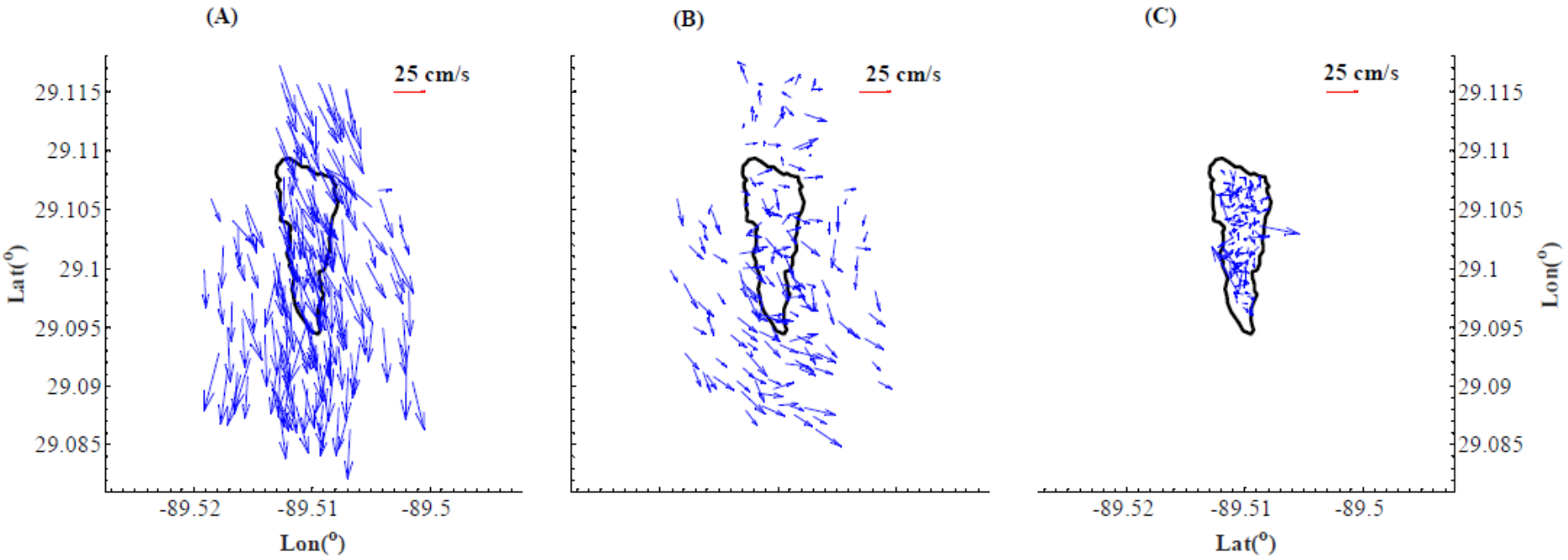
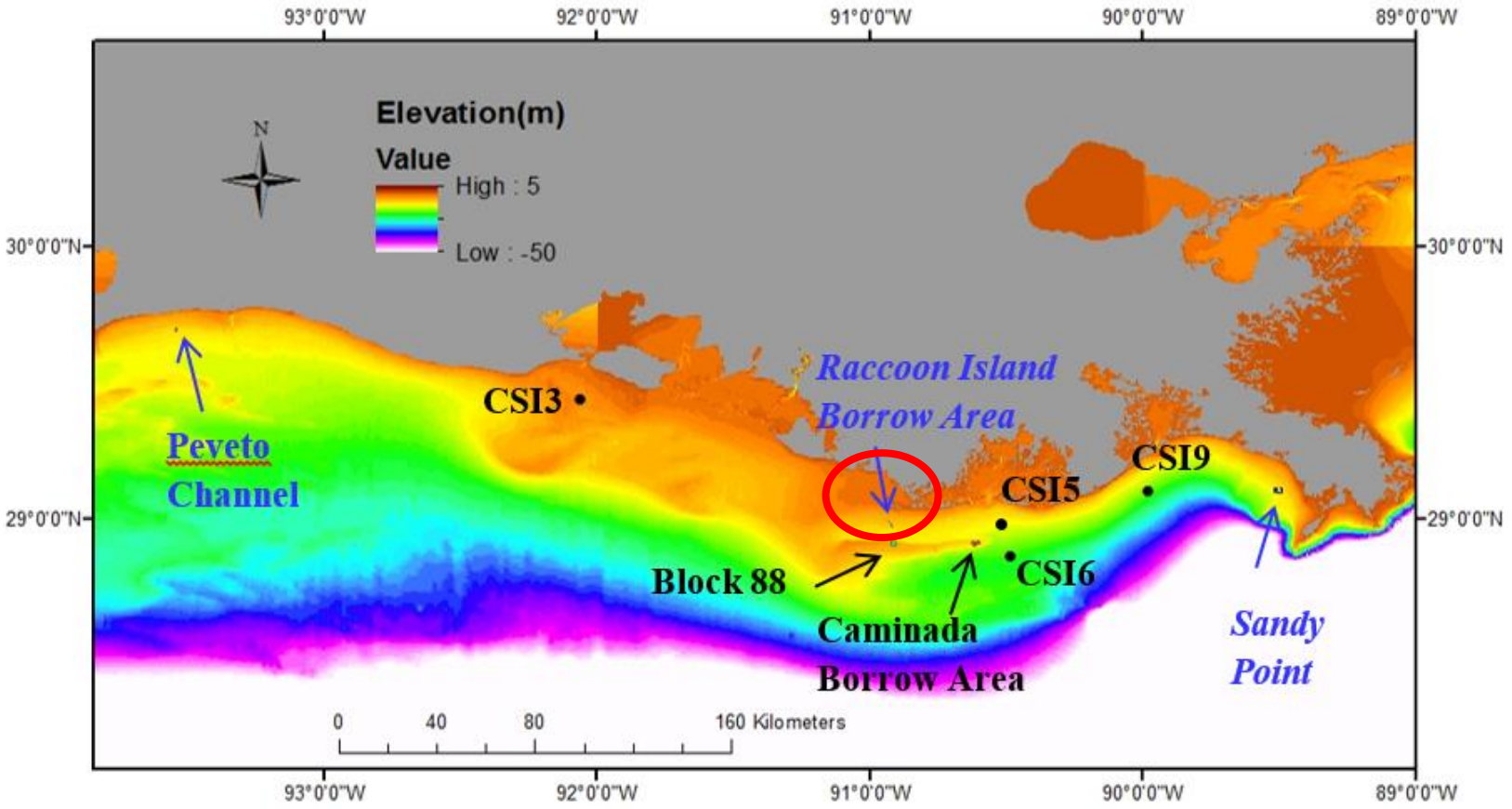


Figure 3. Subsurface current velocity (**A**) 2.75 m below the surface; (**B**) 7.75 m subsurface; (**C**) 16.50 m subsurface at Sandy Point Dredge Pit, and the black line is the edge of the pit in 2015.

Take-home Messages

- Pit wall gets more gentle
- Infilling rate around 0.5-1 m/year
- Fast currents at sea surface but slow ones on pit bottom

Raccoon Island Dredge Pit
(middle, paleo river channel)



Bathymetry

Depth (m)

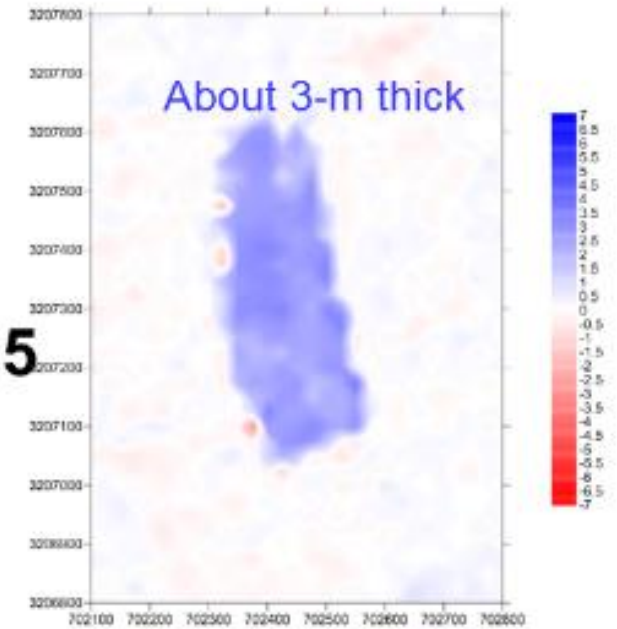
15
14.5
14
13.5
13
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7

Mar 2013

Jun 2015

North (m)

East (m)



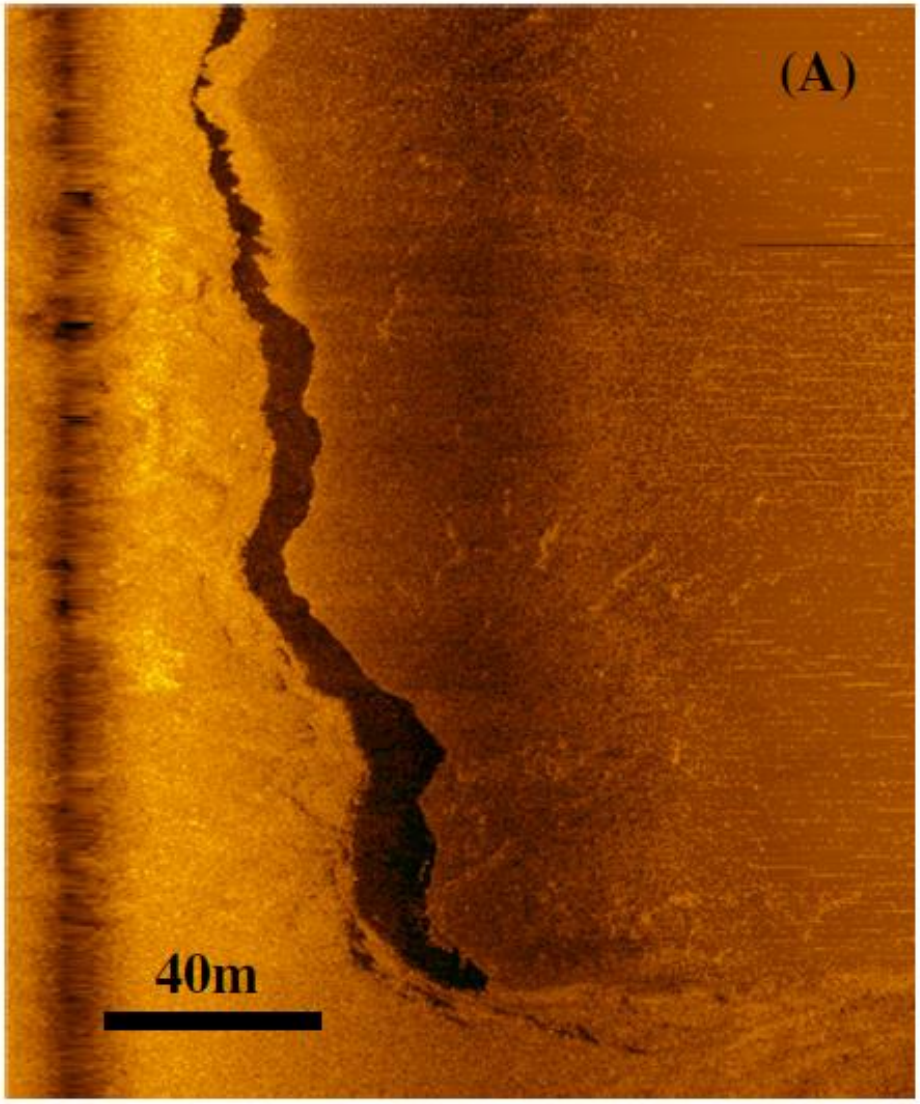
Deposition

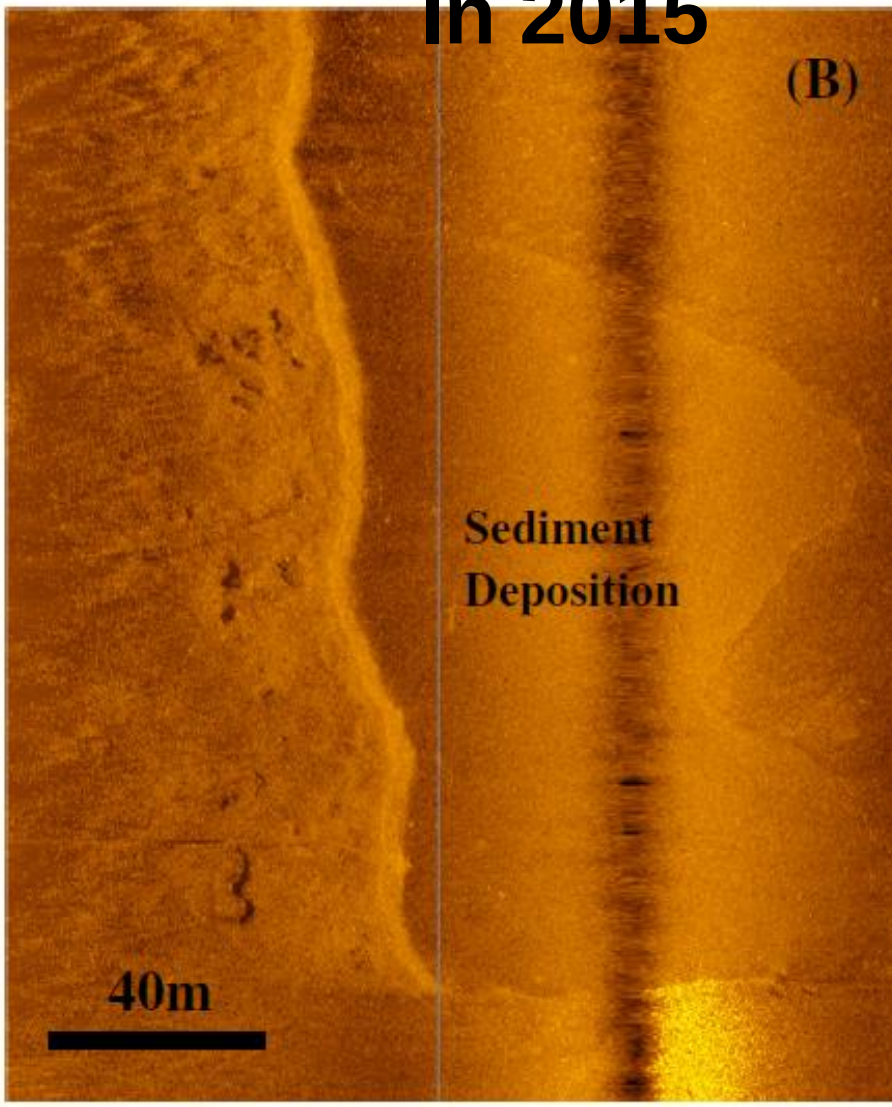
Difference (m)

Erosion

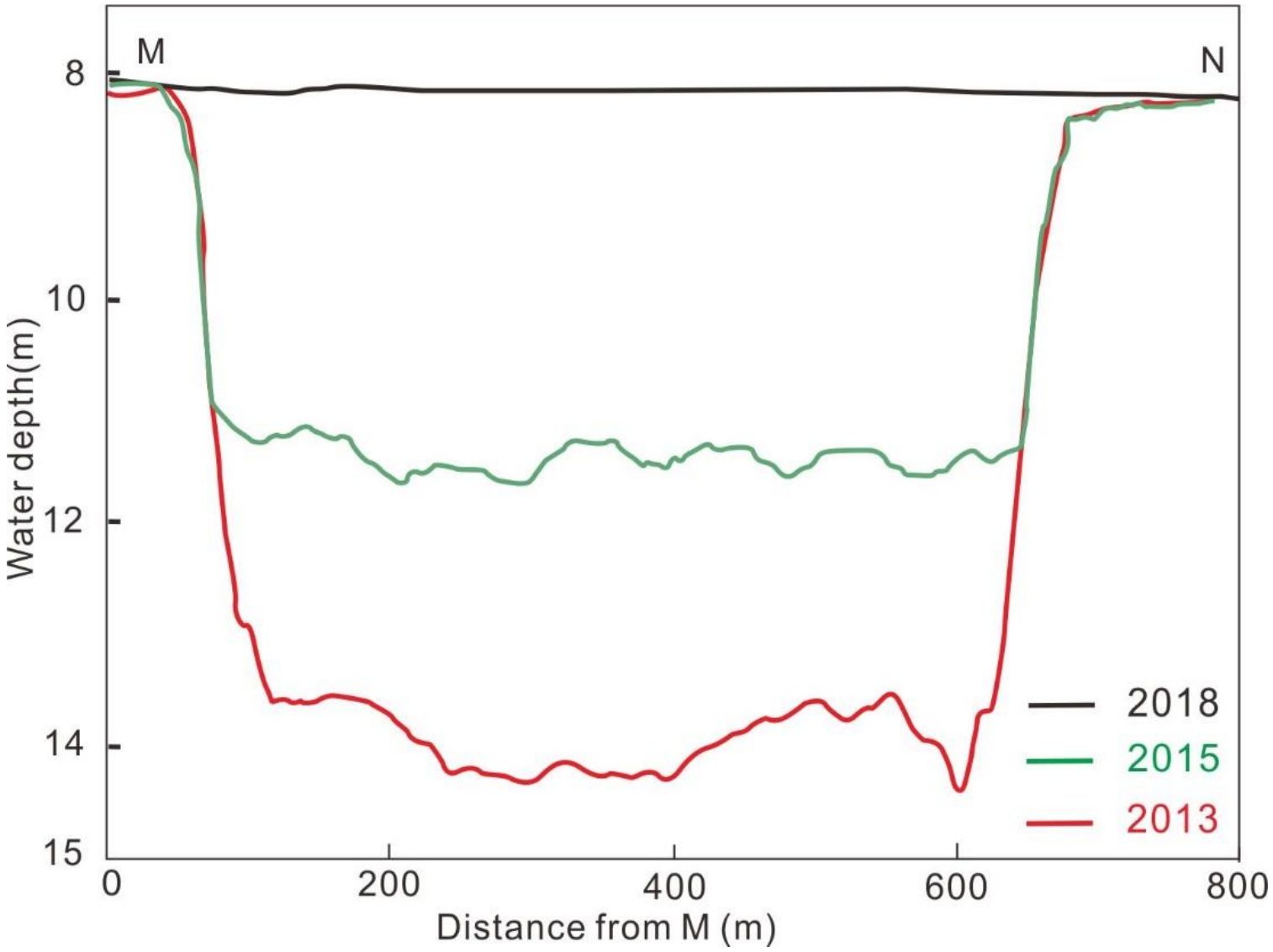
Mar 2013 – Jun 2015

SideScan In 2015

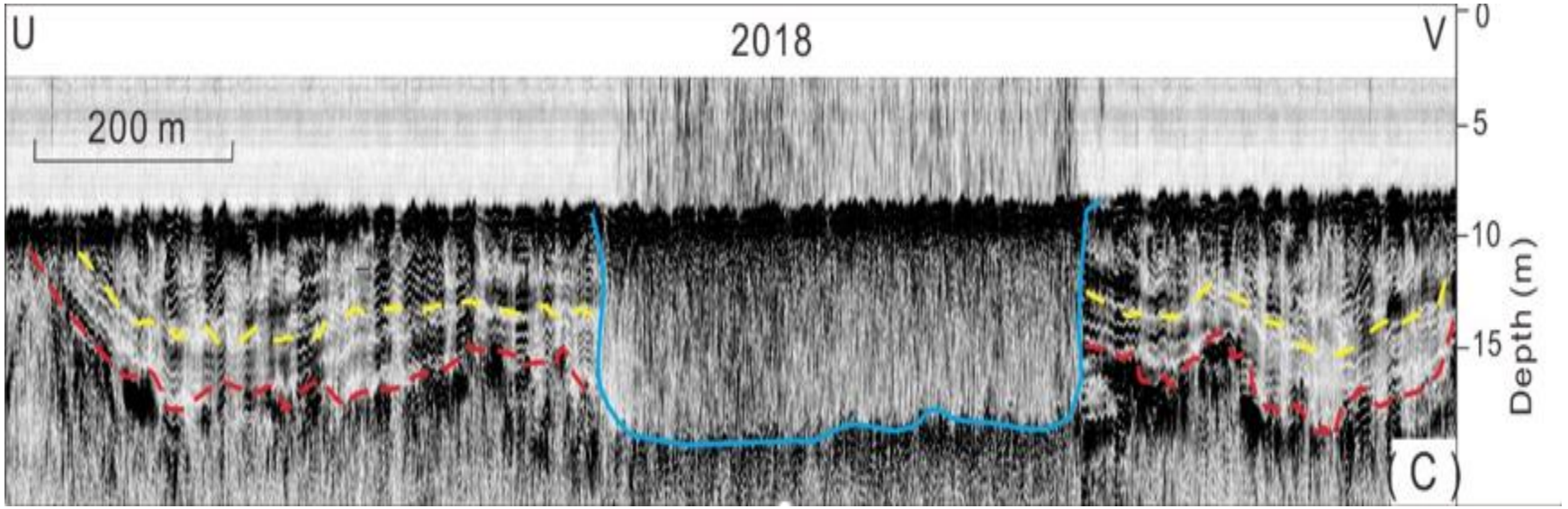




Bathymetry


M
N
8
10
12
14
15
Water depth(m)
0
200
400
600
800
Distance from M (m)
2018
2015
2013

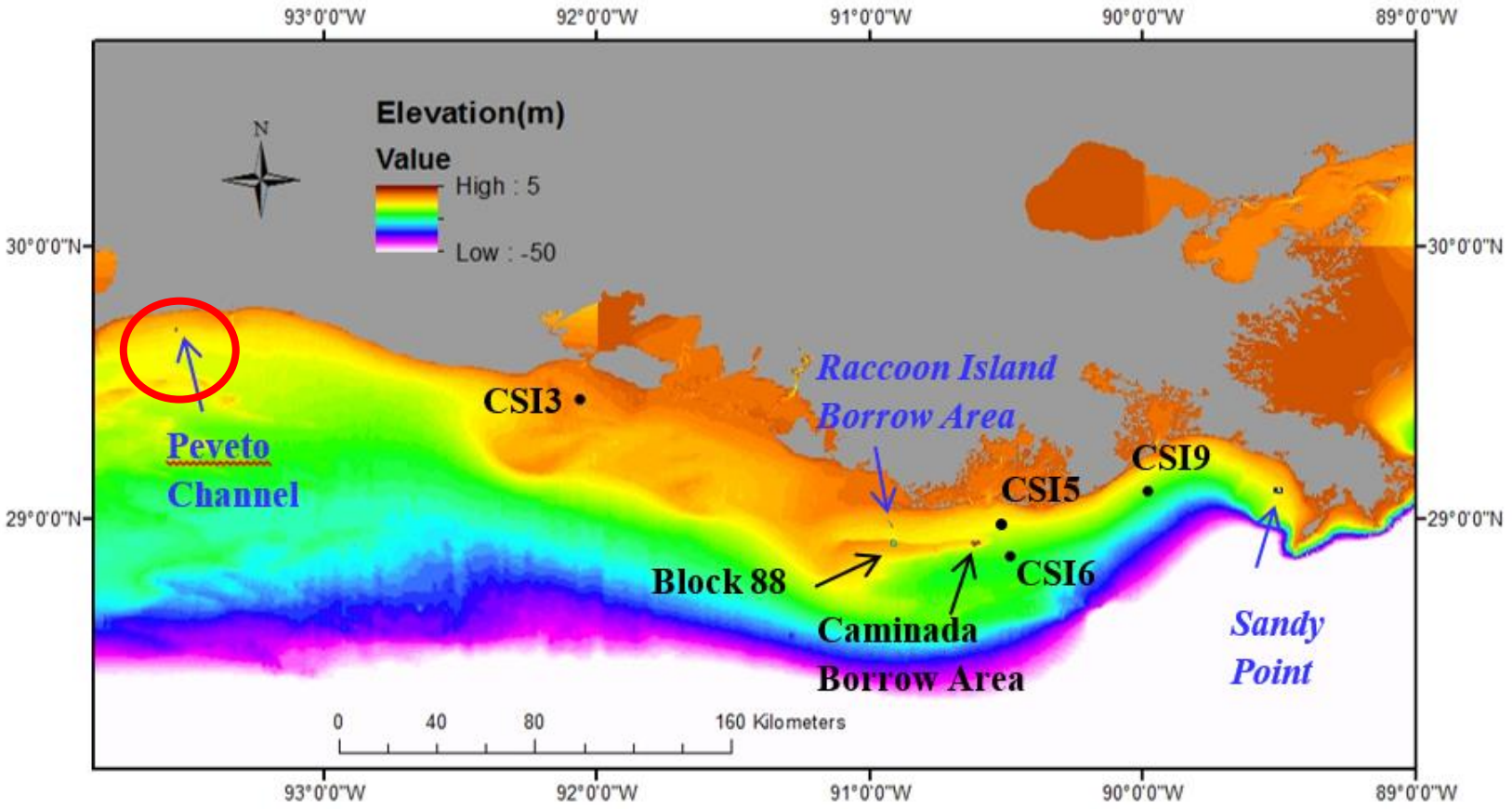
Subbottom



Take-home Messages

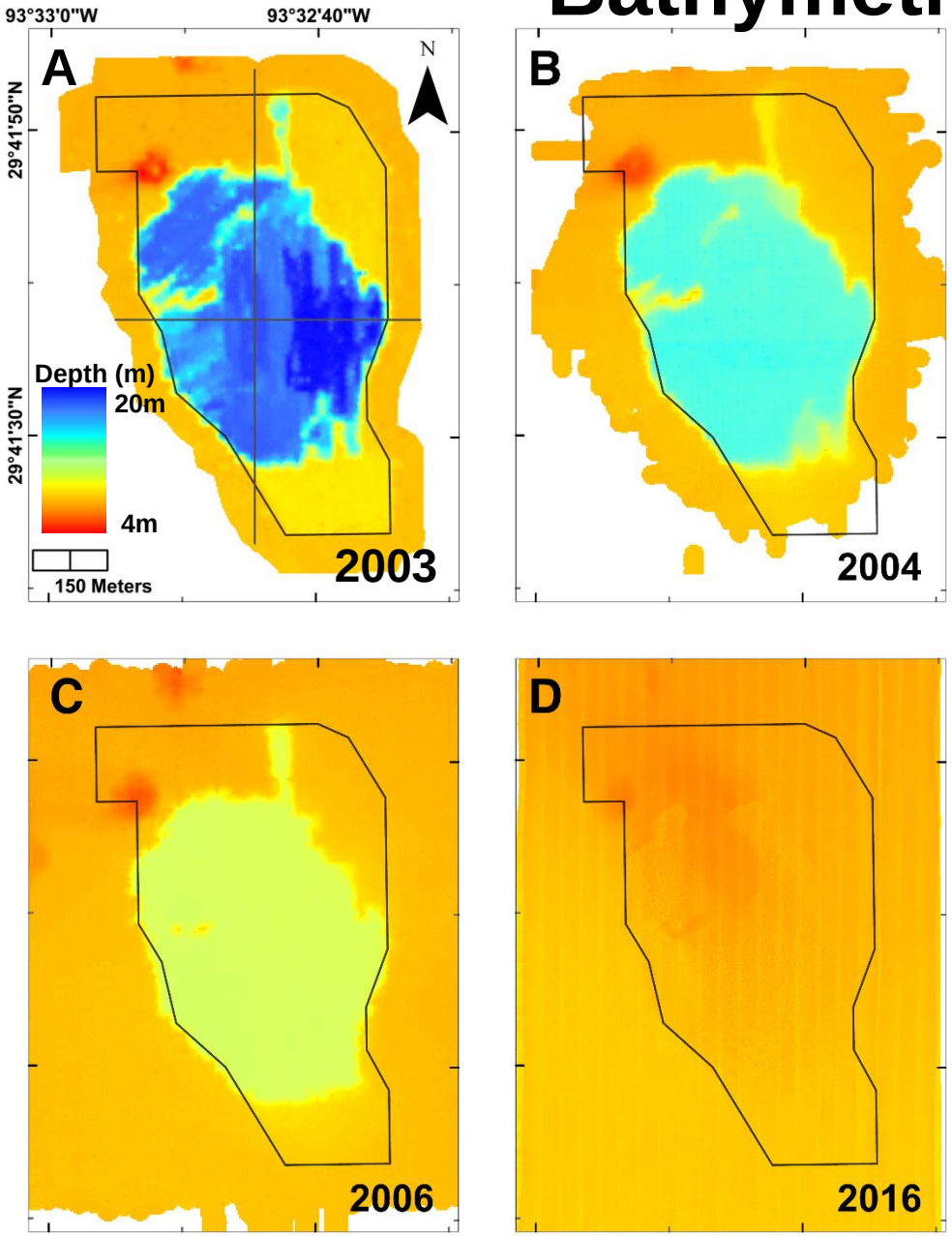
- Rough and sharp pit walls
- Surprising fast infilling from 2015-2018
- Flat surface with biogenic gas escaping

Peveto Channel Dredge Pit
(west, paleo river channel)



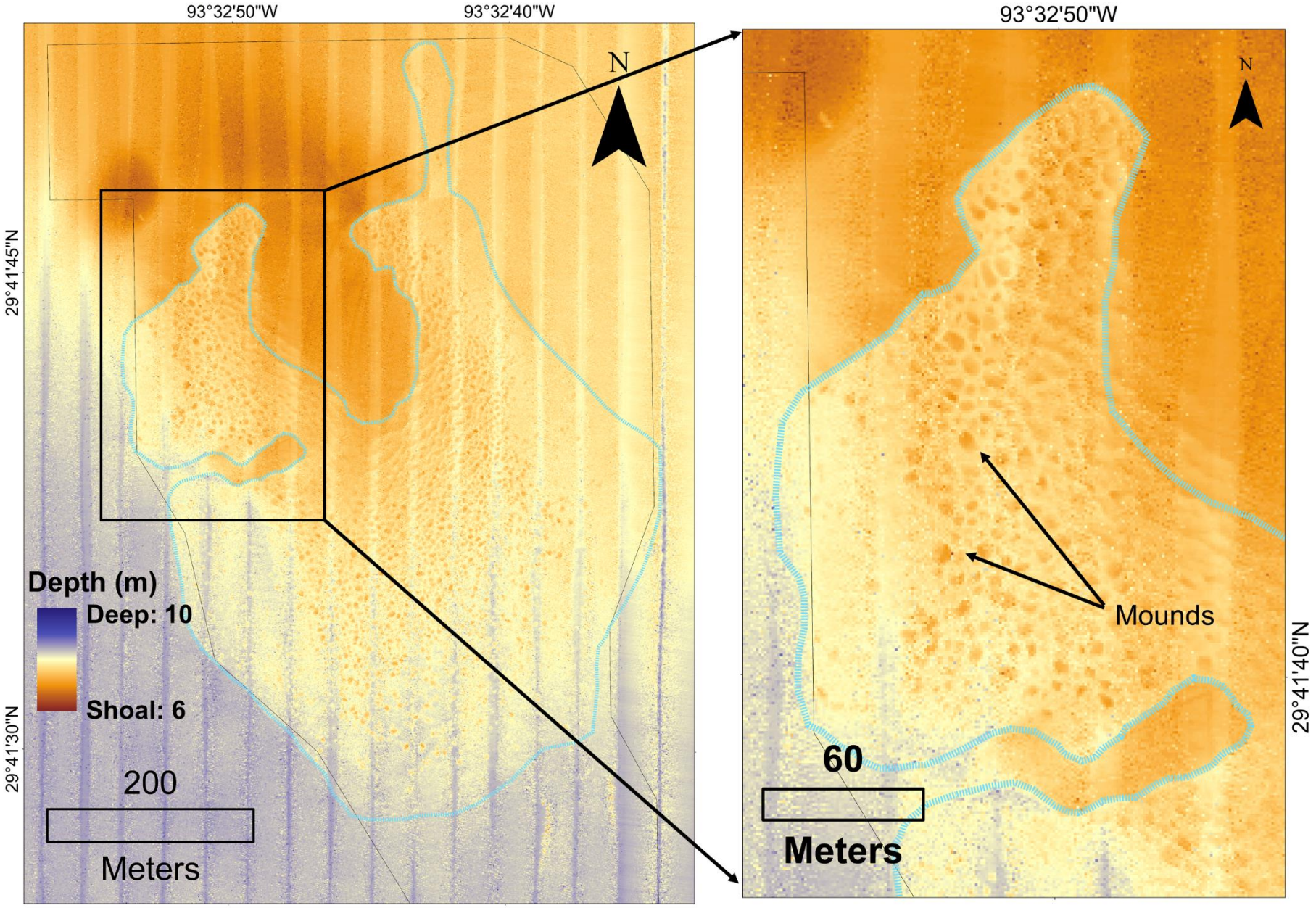
Bathymetry

- Complete infilling in 13 years
- Pit floor evens out over time
- Positive relief in 2016
- Rough pockmarked surface

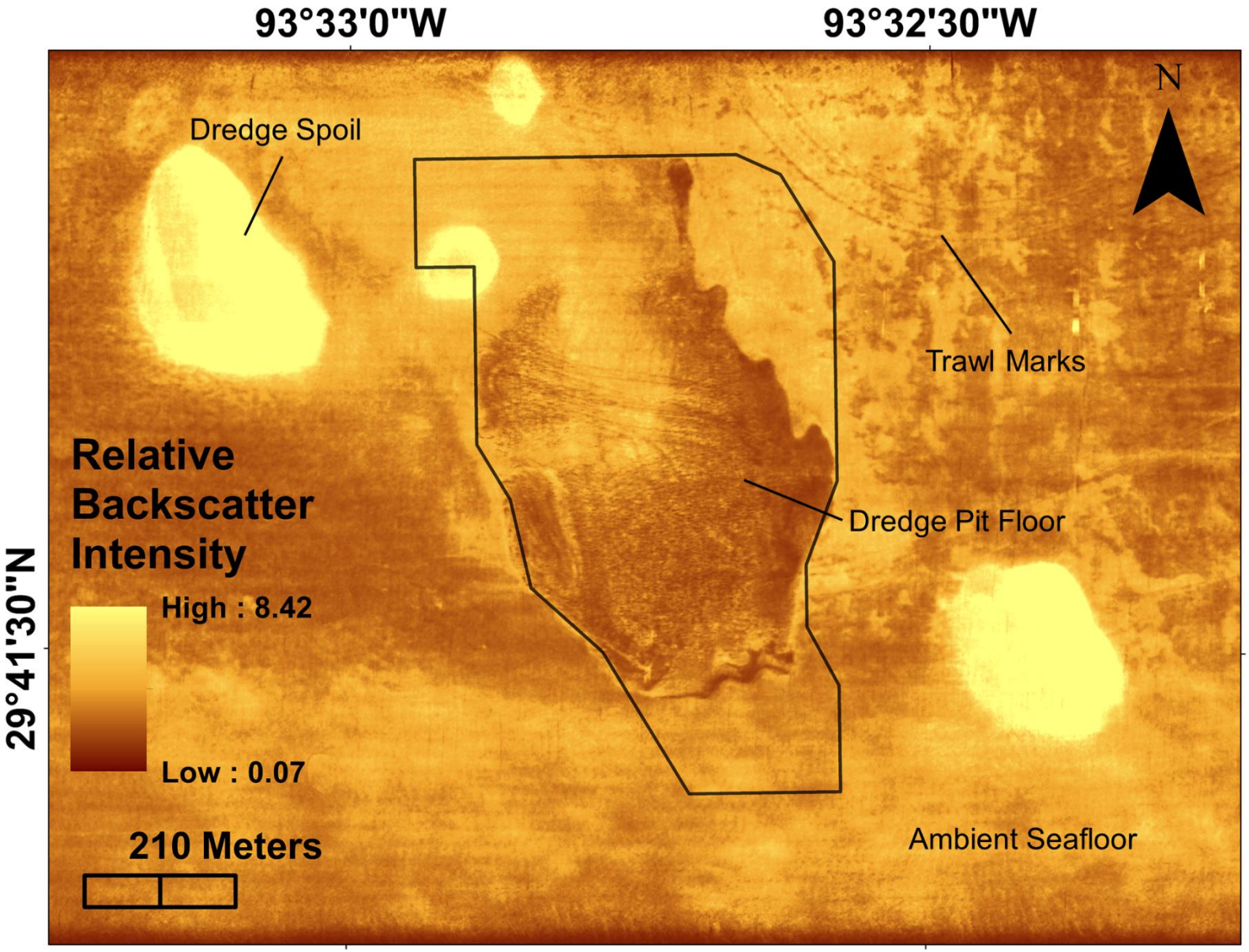


Warm colors=Shallow
Cool colors=Deep

Bathymetry in 2016



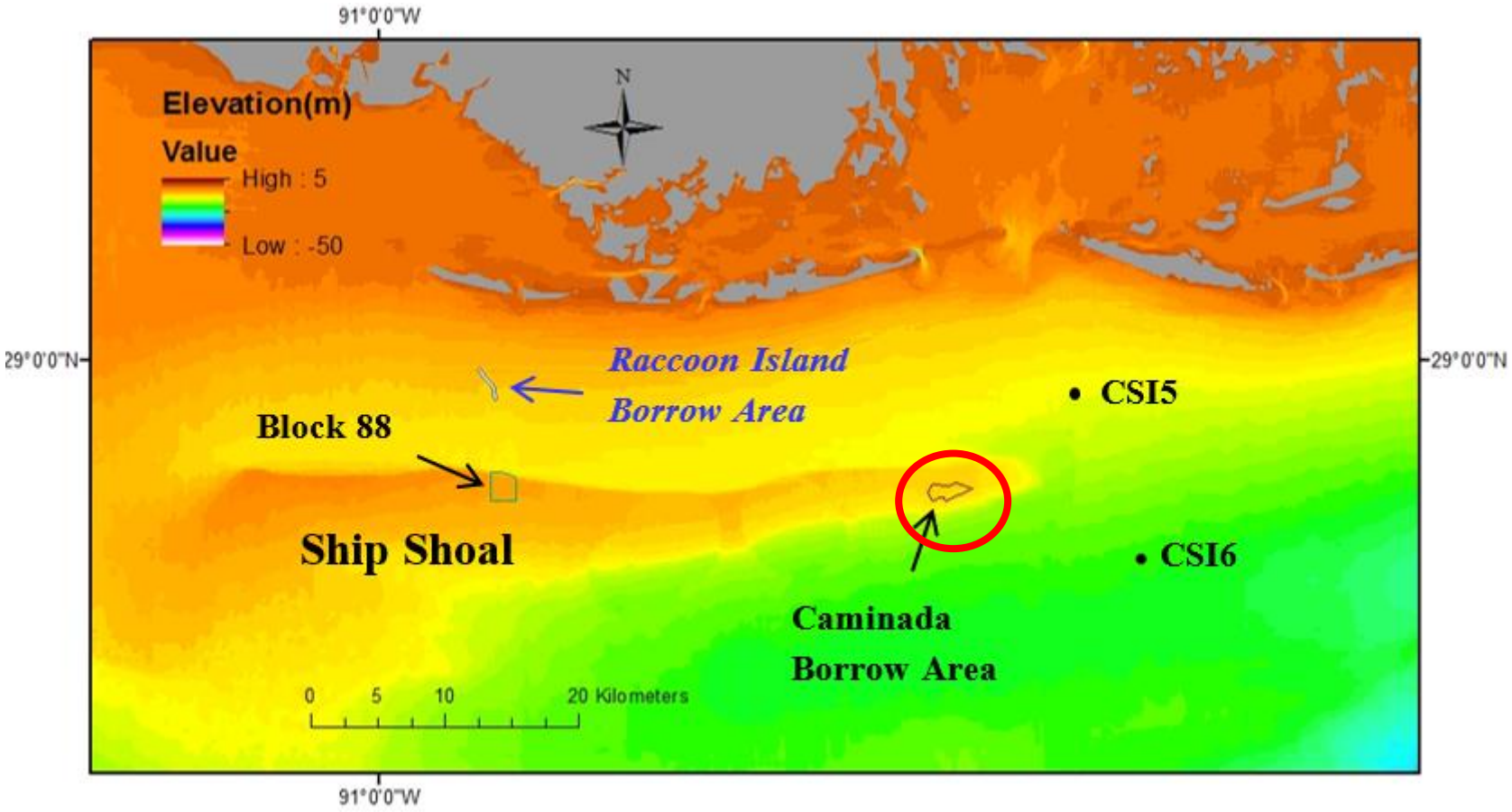
Sidescan in 2016



Take-home Messages

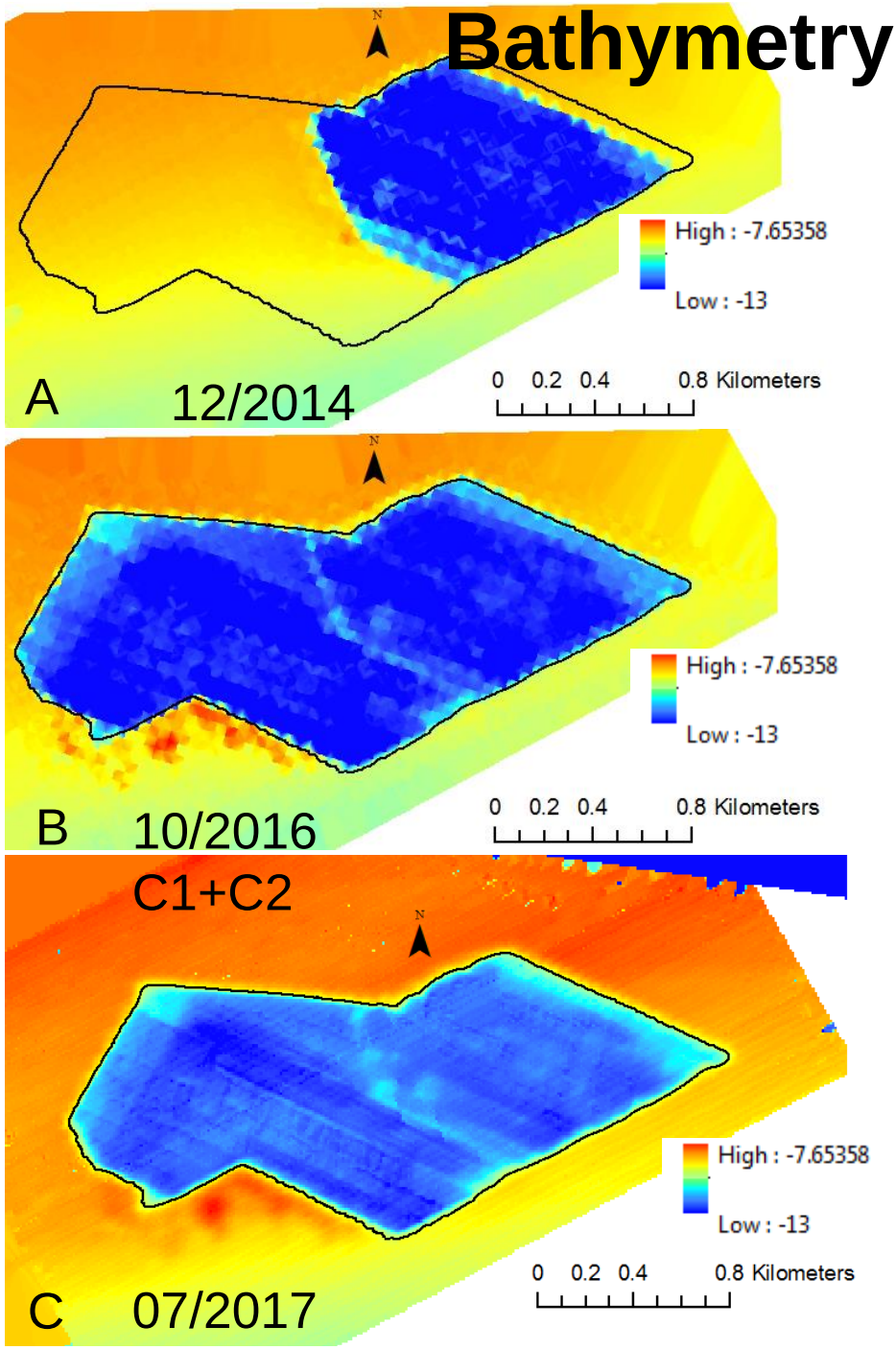
- Mud volcanos
- Continuing degassing and consolidation
- Not ready to build new structure yet

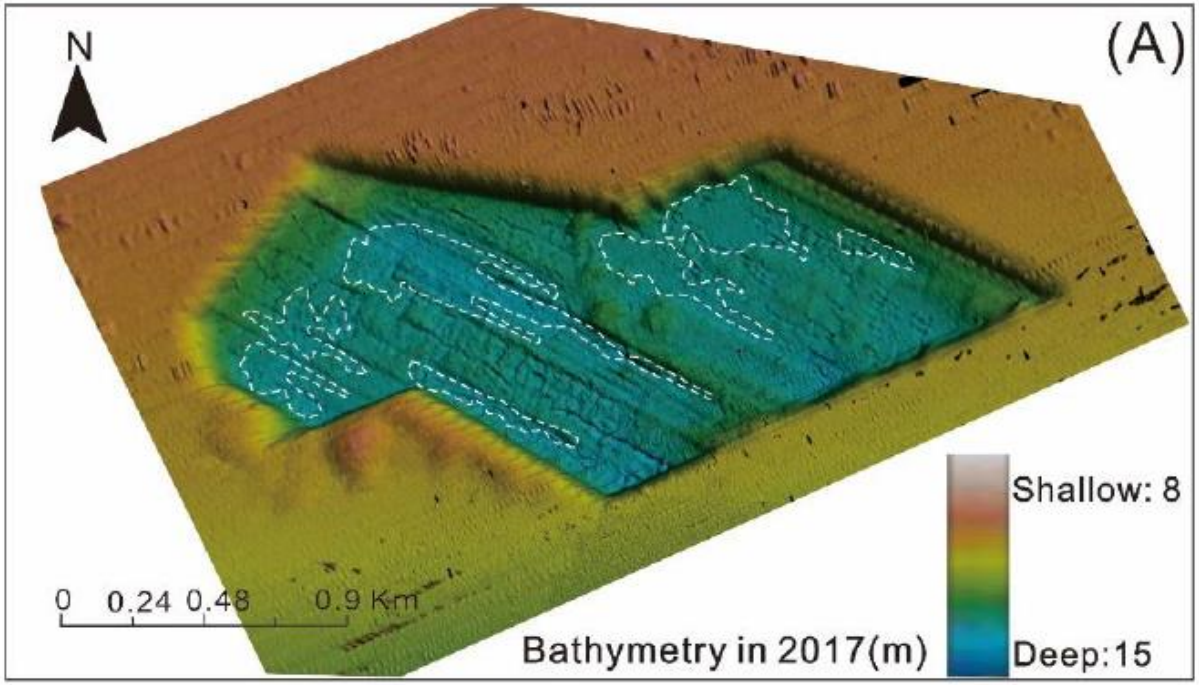
Caminada Dredge Pit
(mid, sandy shoal)



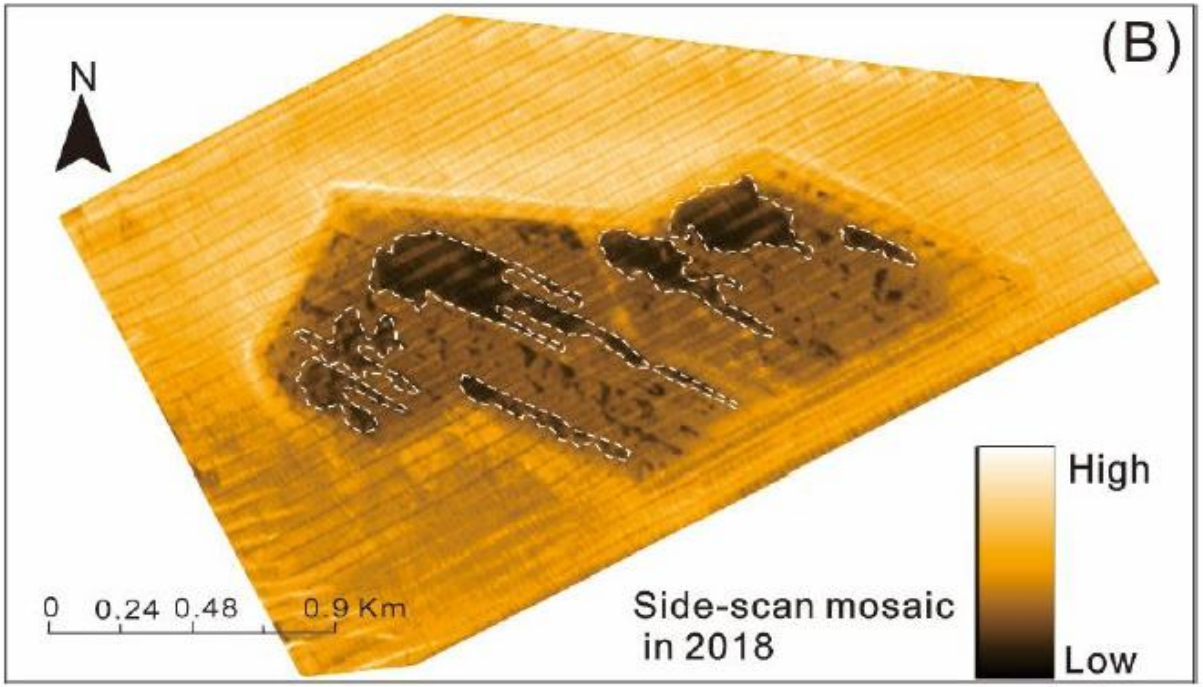
Bathymetric Data

- Sand is borrowed for the restoration of Caminada Headland.
- Increments I and II.



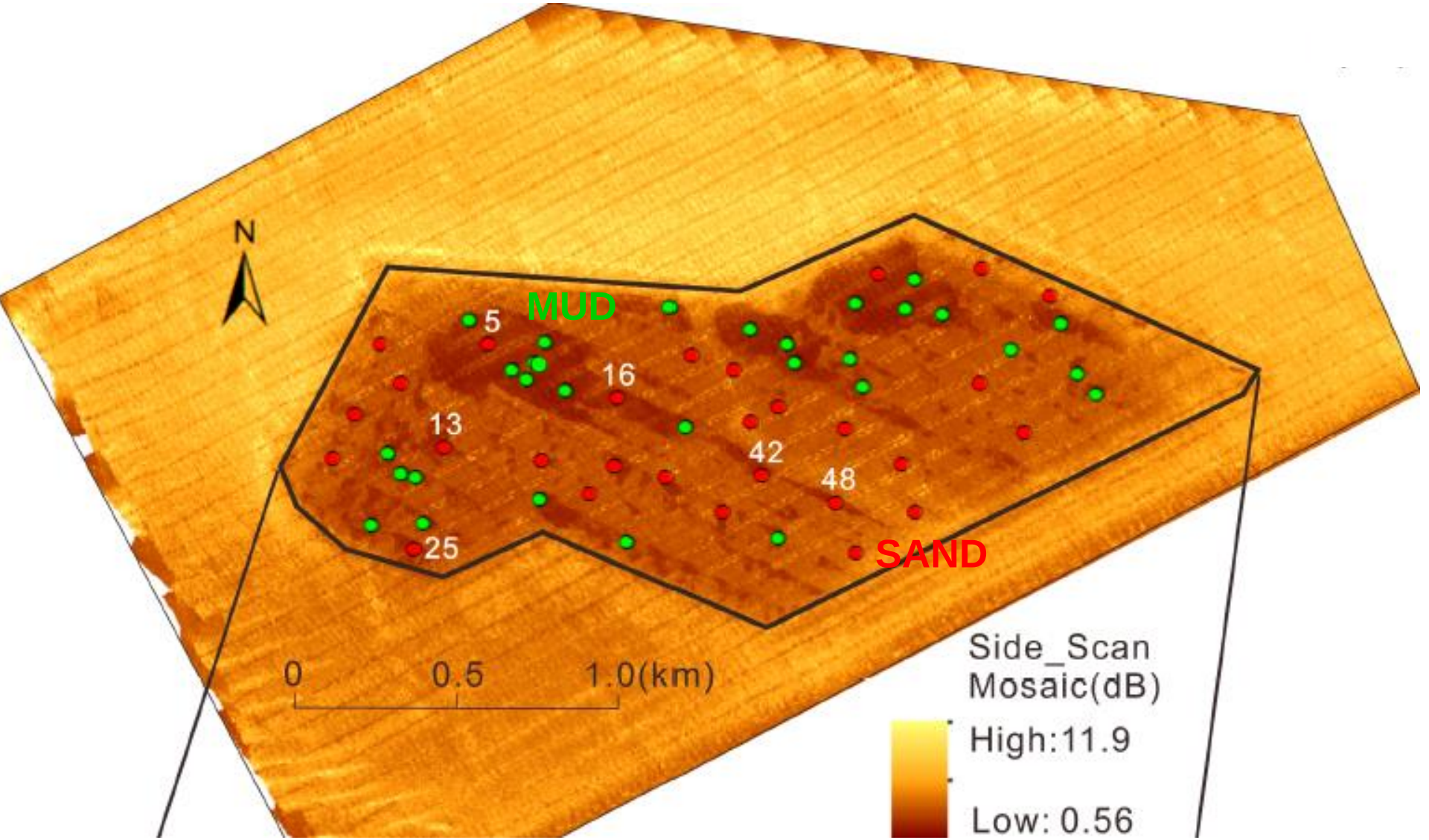


Bathymetry 2017



Sidescan 2018

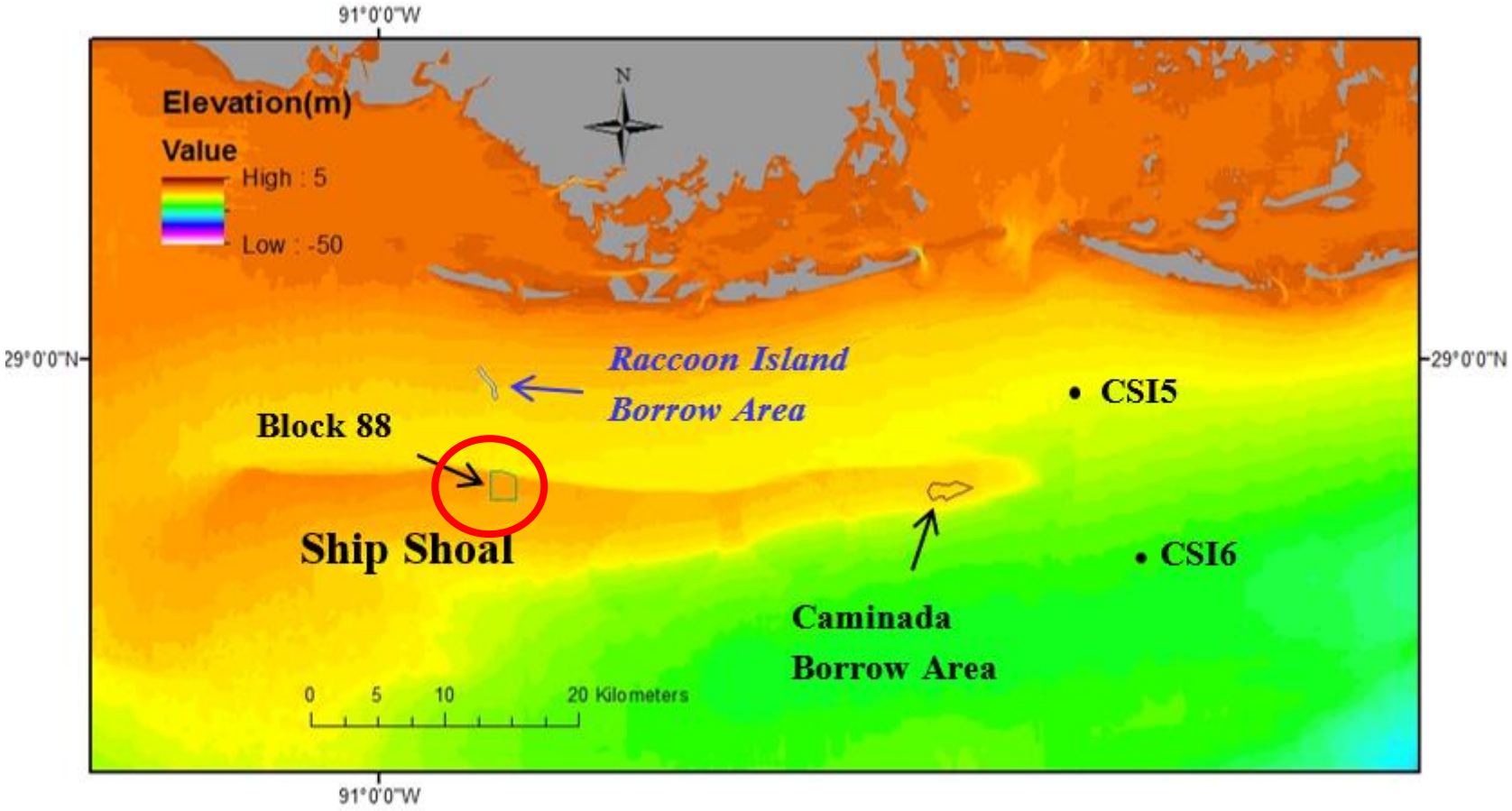
Sidescan 2018



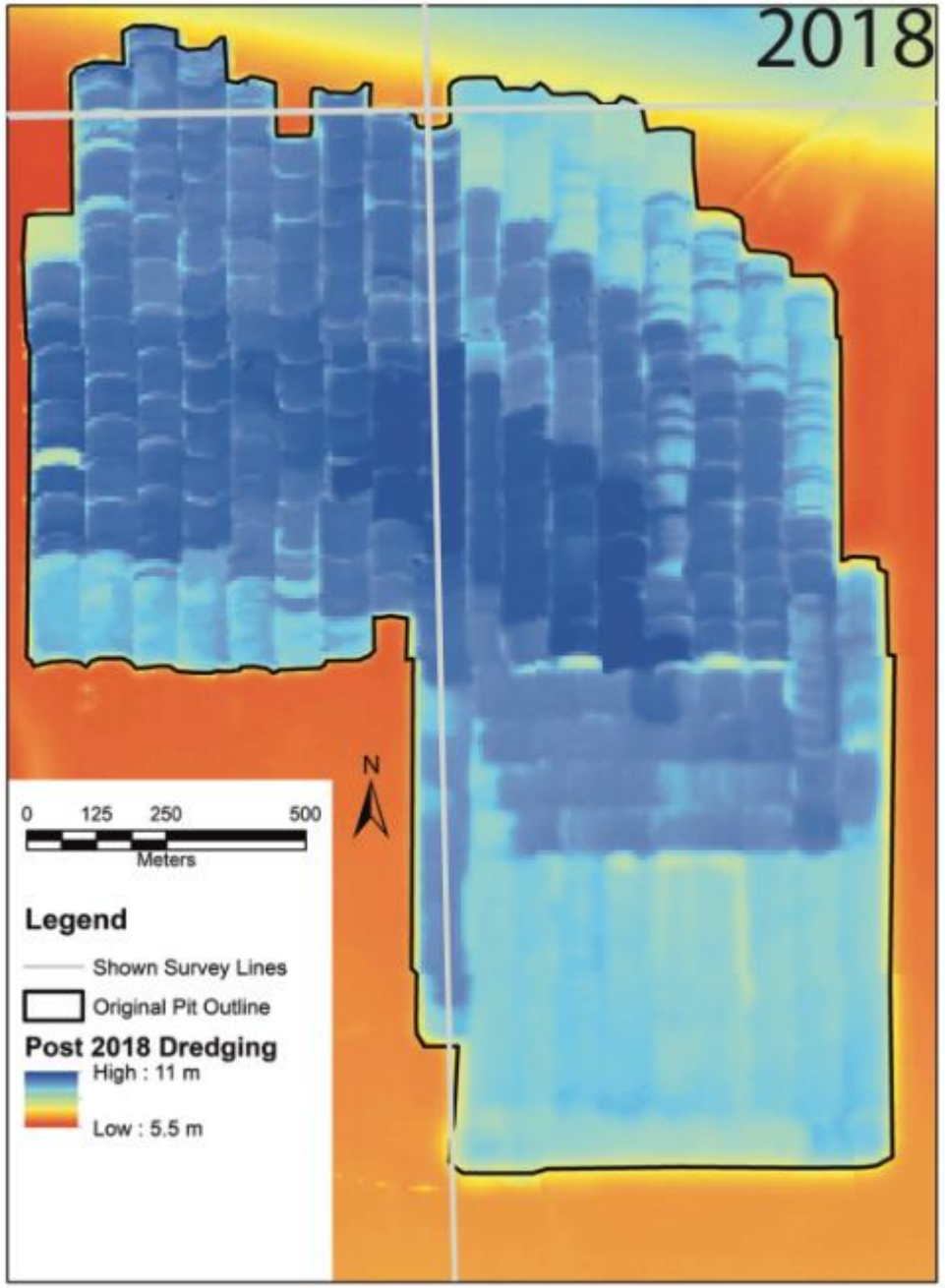
Take-home Messages

- Sand + mud
- Topographic low → mud
- Slow accumulation

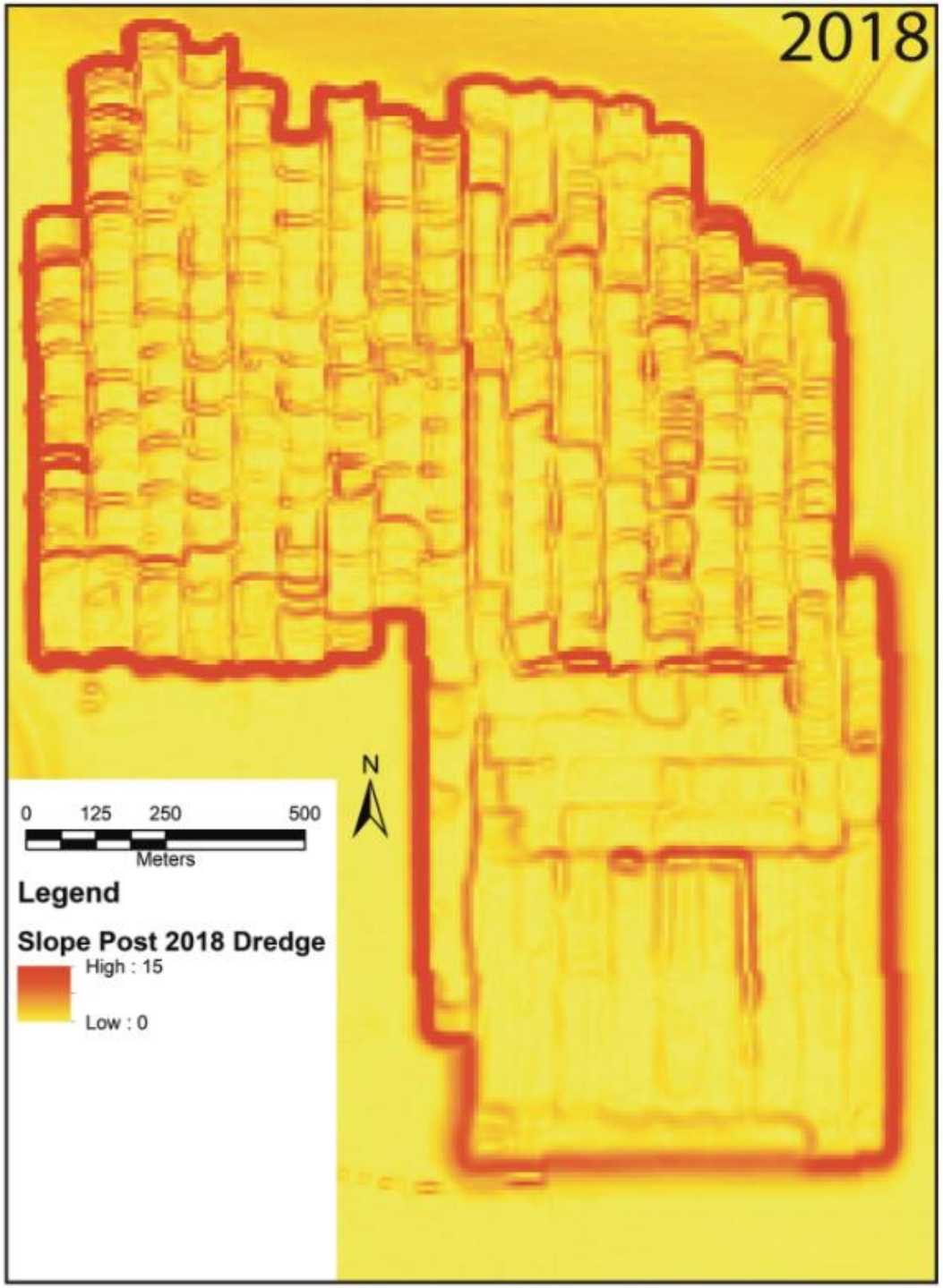
Block88 Dredge Pit
(mid, sandy shoal)



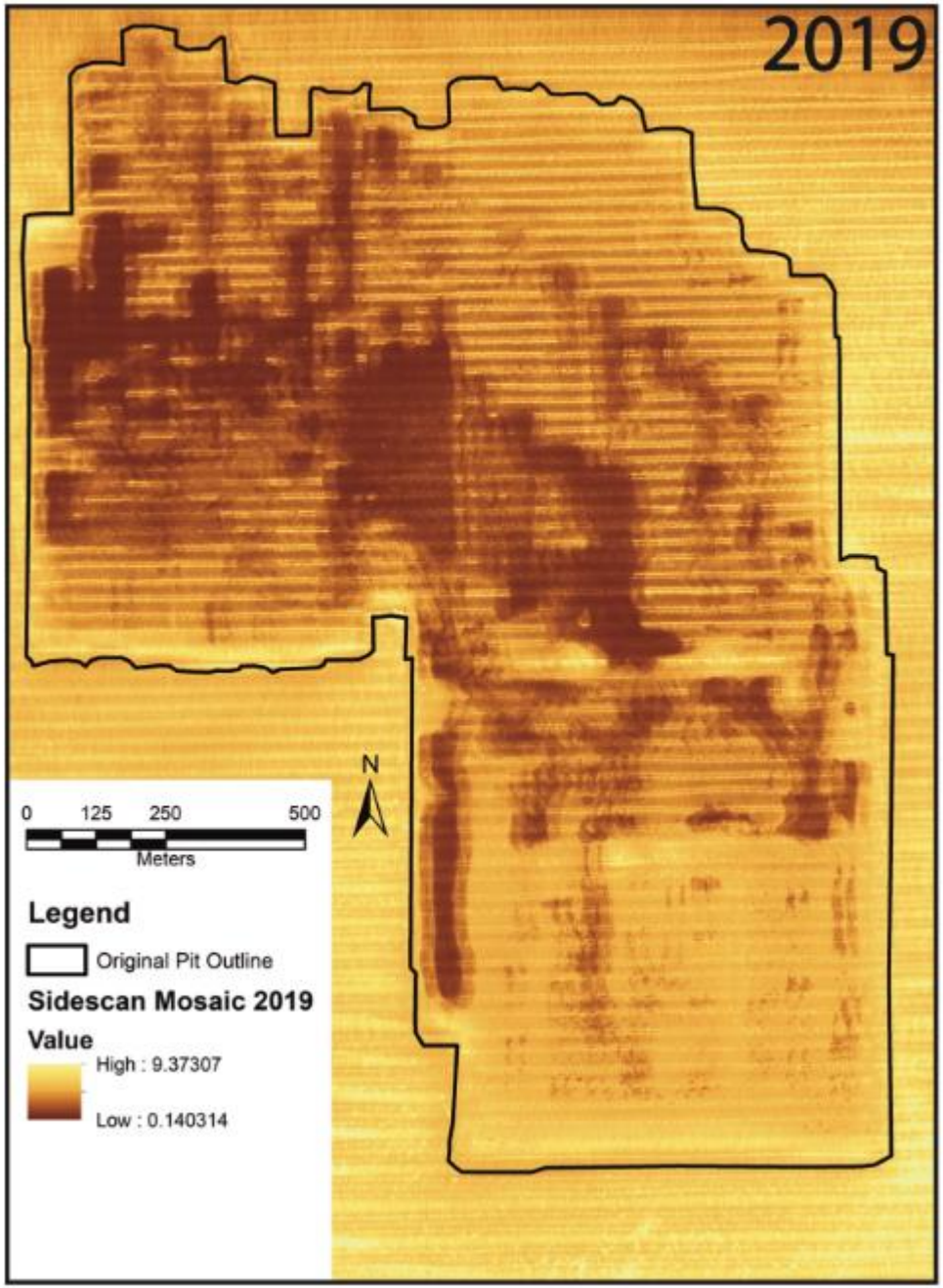
Bathymetry


2018
N
0
125
250
500
Meters
Legend
Shown Survey Lines
Original Pit Outline
Post 2018 Dredging
High : 11 m
Low : 5.5 m

Bathymetric Slope



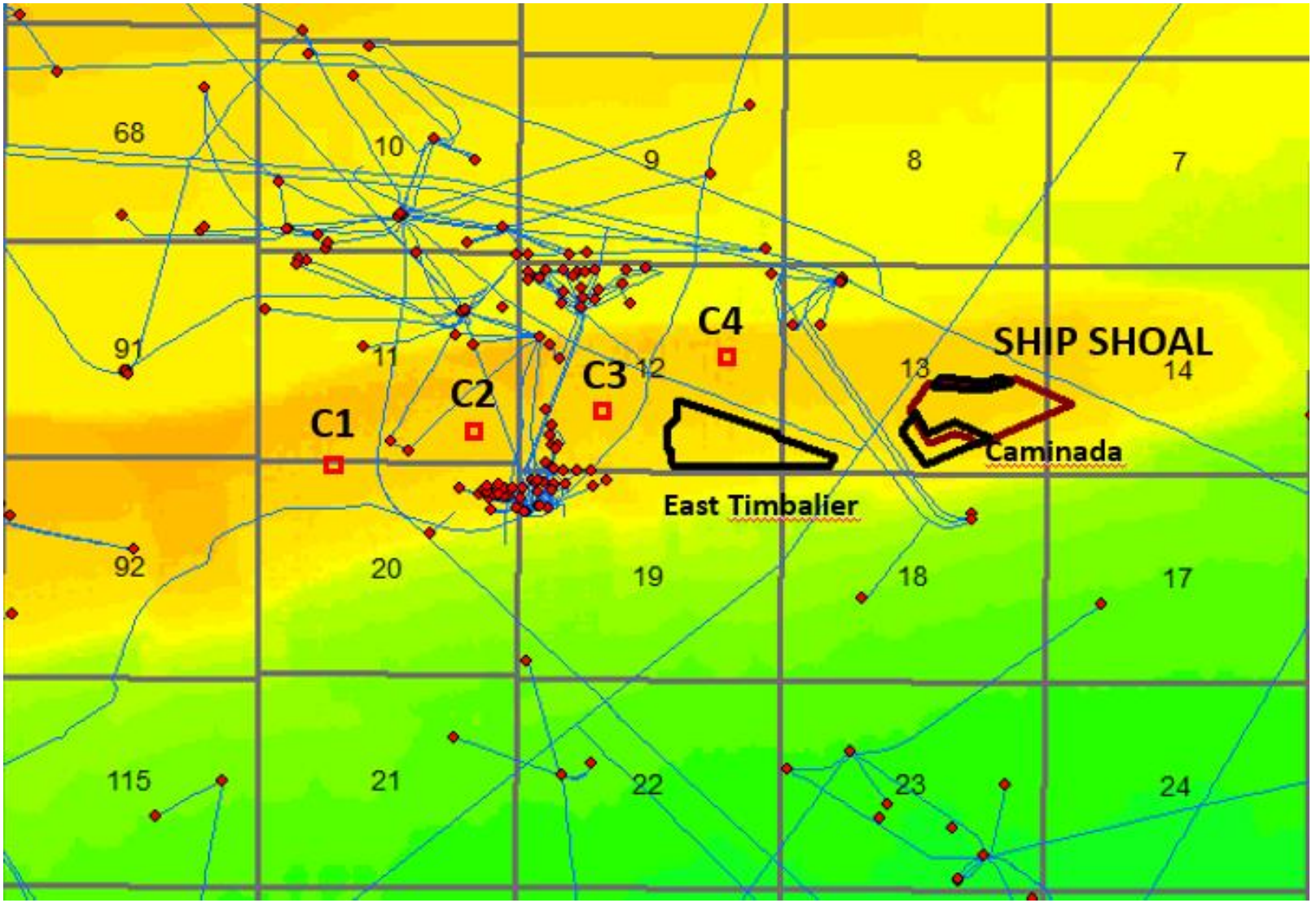
Sidescan


2019
N
0
125
250
500
Meters
Legend
Original Pit Outline
Sidescan Mosaic 2019
Value
High : 9.37307
Low : 0.140314

Take-home Messages

- Dredging “cuts”
- Low backscatter in topographic low

What is next?


68
10
9
8
7
91
11
12
13
14
C1
C2
C3
C4
SHIP SHOAL
Caminada
East Timbalier
92
20
19
18
17
115
21
22
23
24