GLACIAL LAKES IN SOUTHERN NEW ENGLAND

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W. Alton Jones Campus
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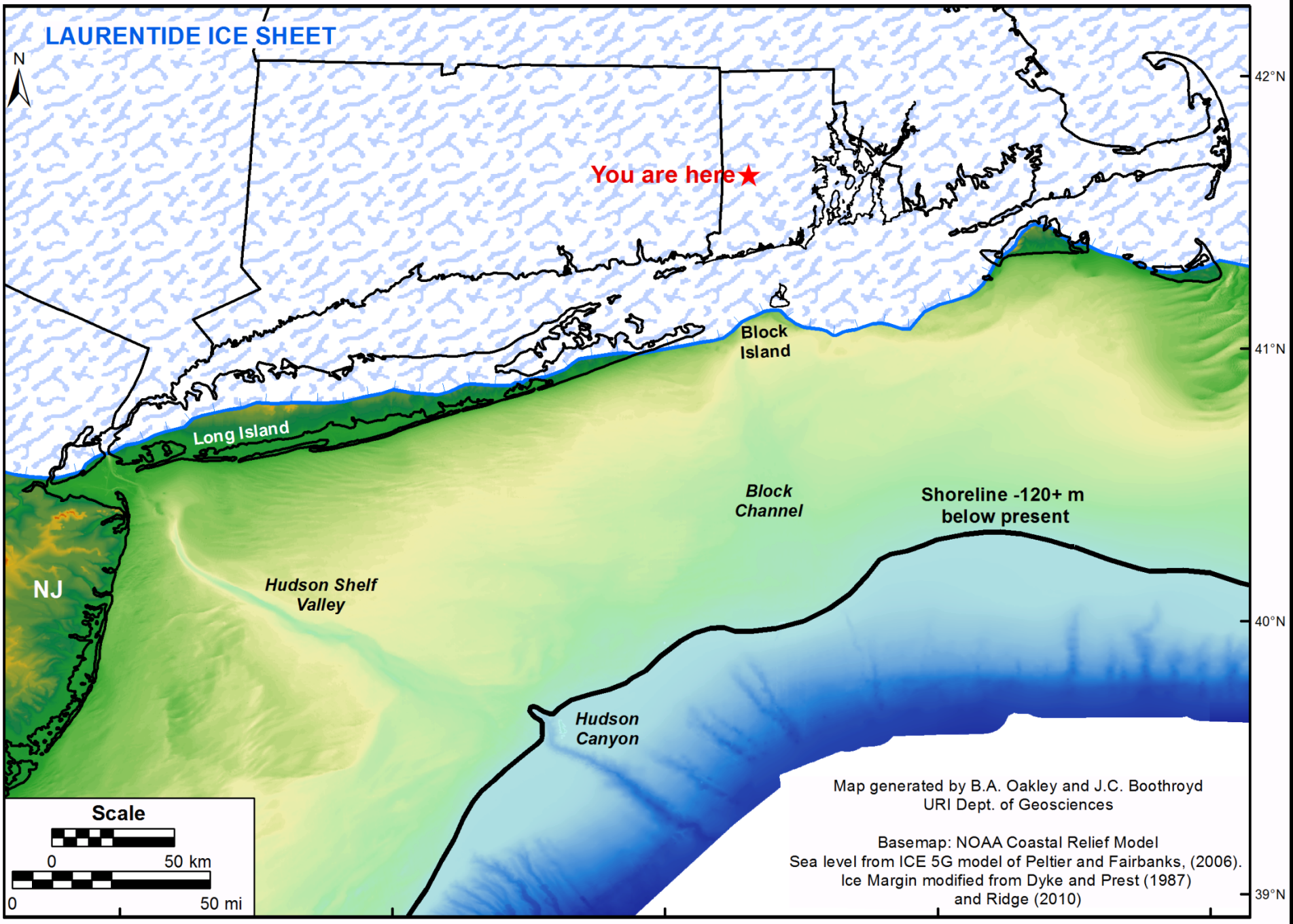
Glacier Lake, Iceland

Photo: Anders Brownworth - http://www.anders.com/

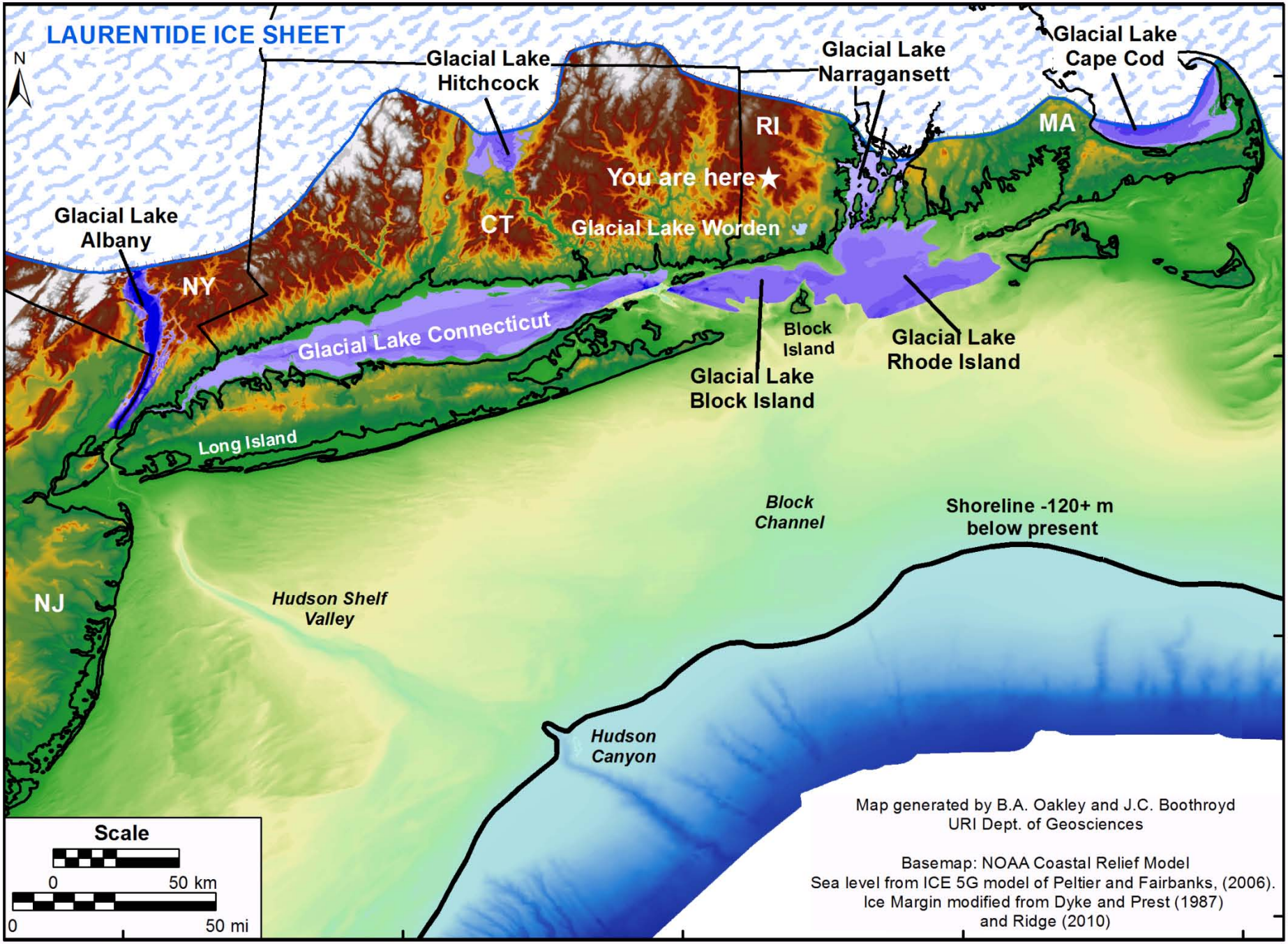
Why glacial lakes?

- Record of Isostatic rebound
- Varve chronologies
- Climate signal (sediment and landforms)
- Ice sheet dynamics
- Freshwater that drained to the North Atlantic (THC)

PALEOGEOGRAPHIC MAP OF SOUTHERN NEW ENGLAND - NEW JERSEY CONTINETAL SHELF ~26,000 yBP

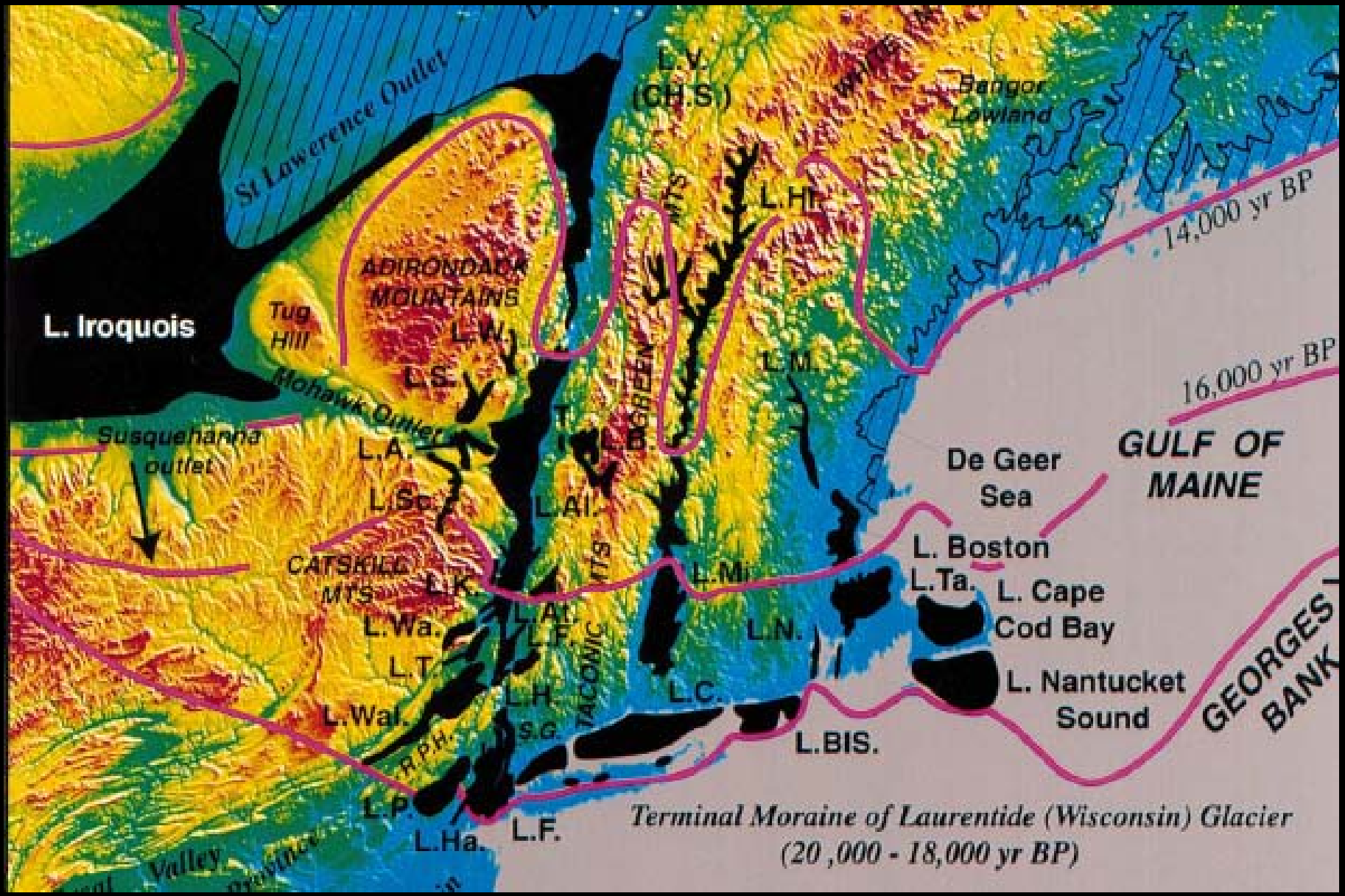


GLACIAL LAKES OF SOUTHERN NEW ENGLAND AND EASTERN NEW YORK

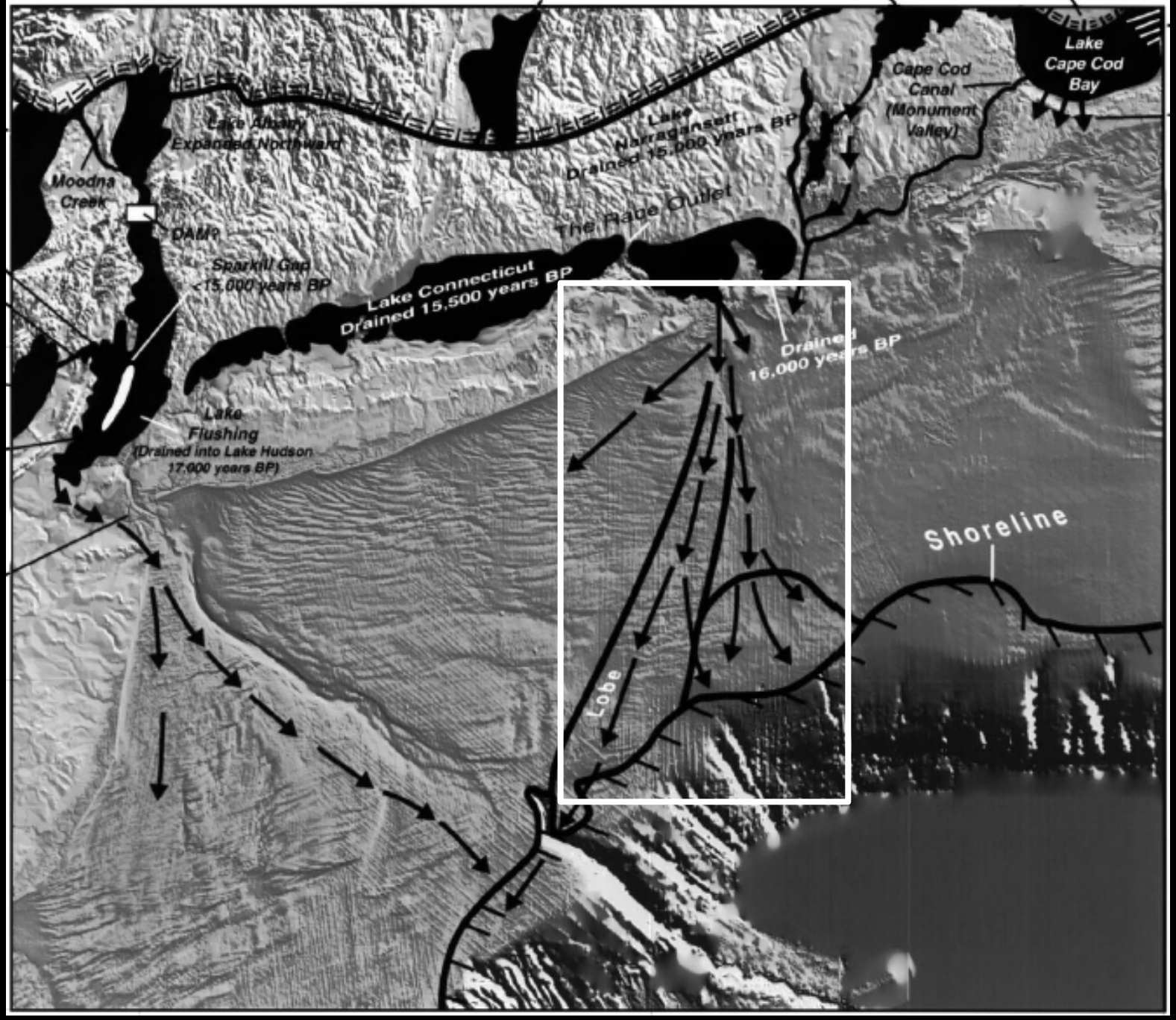


Map generated by B.A. Oakley and J.C. Boothroyd
URI Dept. of Geosciences

Basemap: NOAA Coastal Relief Model
Sea level from ICE 5G model of Peltier and Fairbanks, (2006).
Ice Margin modified from Dyke and Prest (1987)
and Ridge (2010)

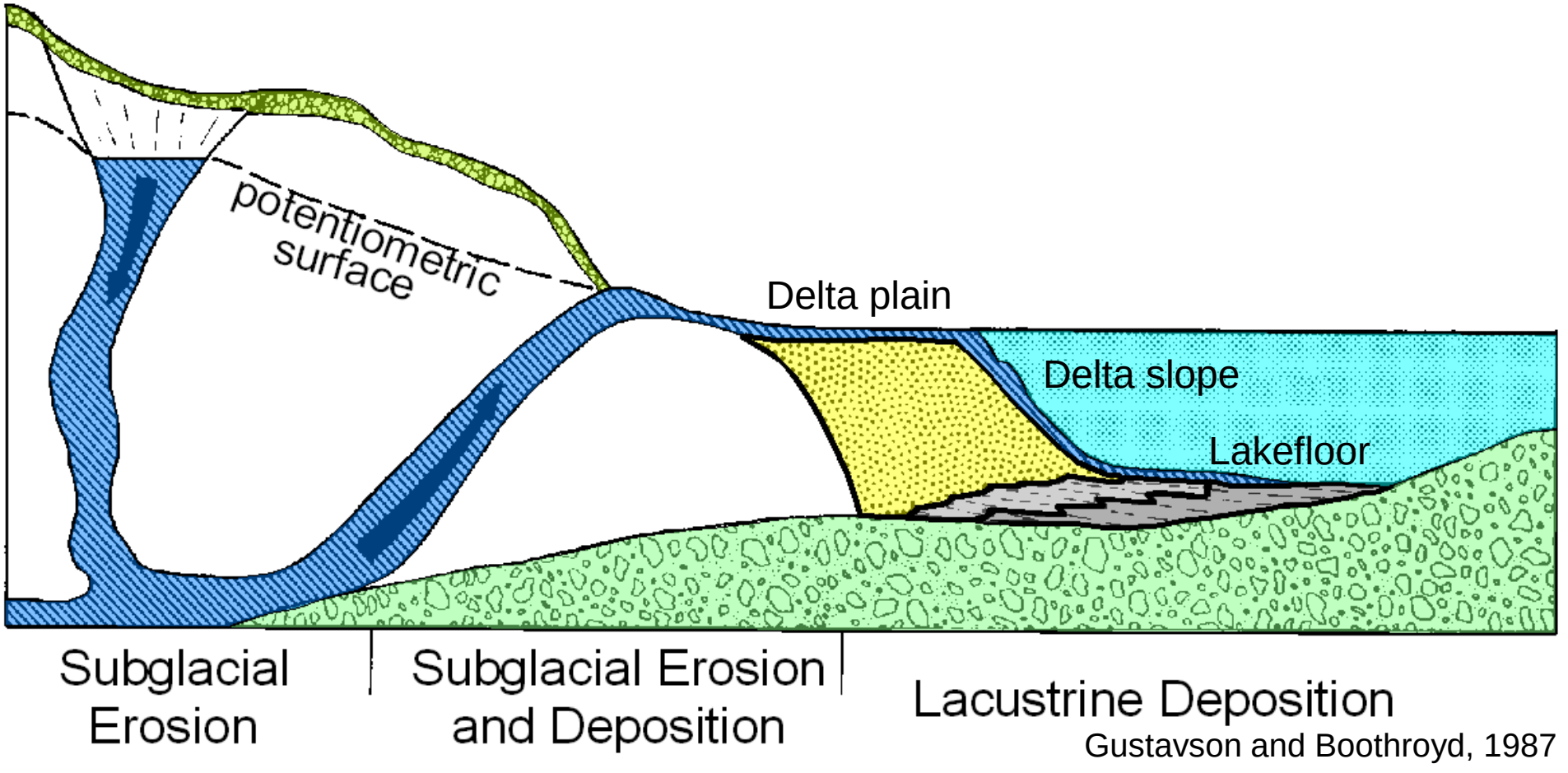


Uchupi et al., 2001



Uchupi et al., 2001

GLACIAL LACUSTRINE DELTAS

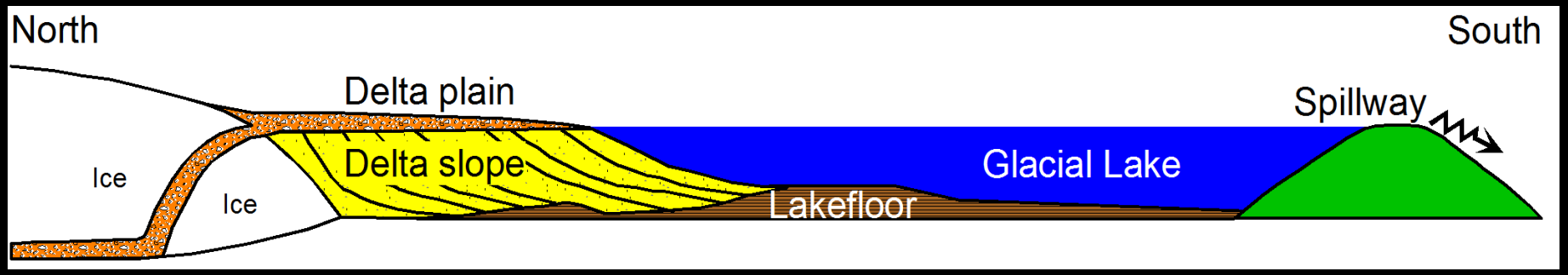


Gustavson and Boothroyd, 1987

DELTA SLOPE DEPOSITION IN GLACIAL LAKE HITCHCOCK
Hartford Basin, CT

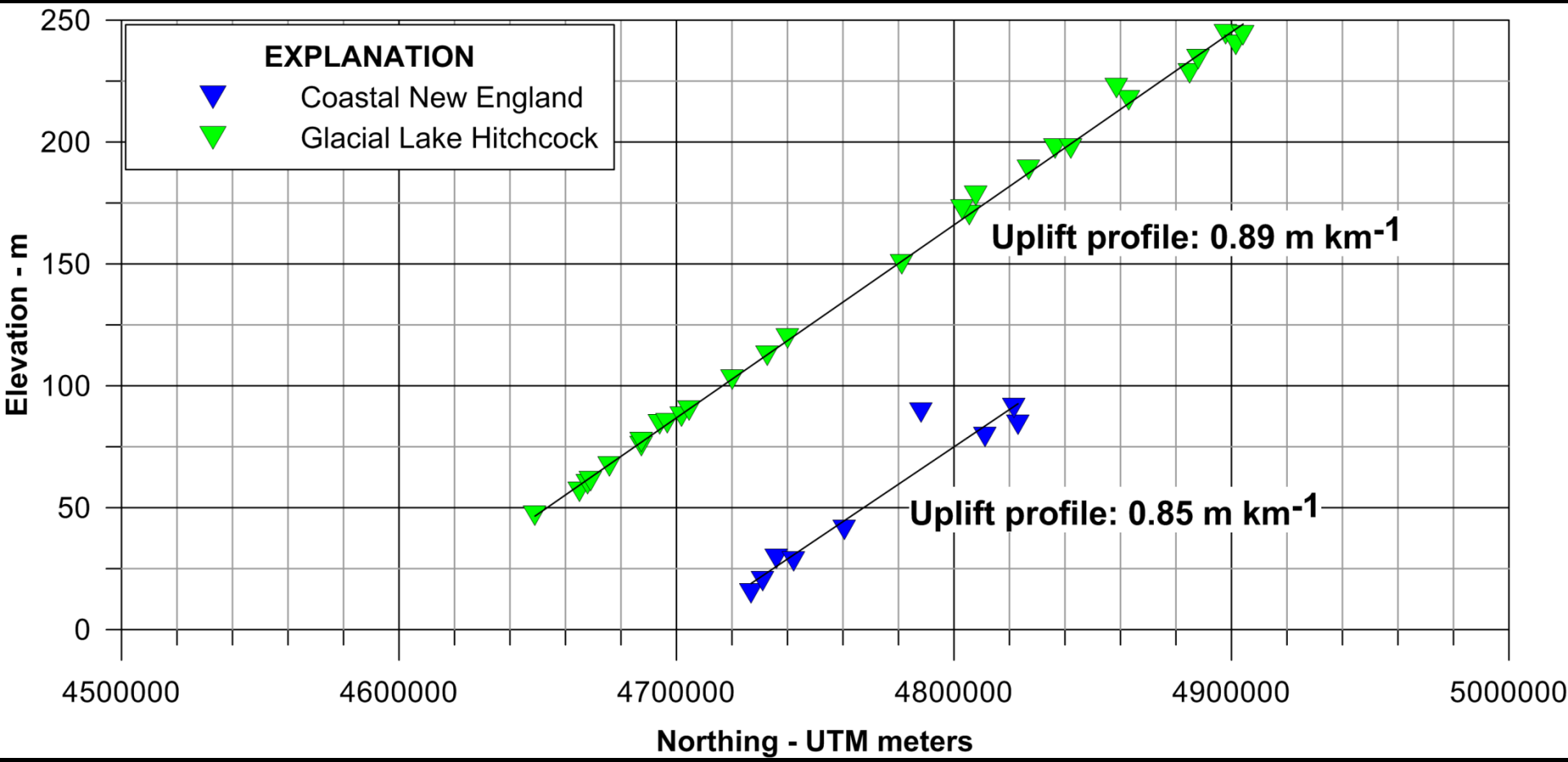
Oakley, 2005

ISOSTATIC CONTACT DELTA MORPHOSEQUENCES



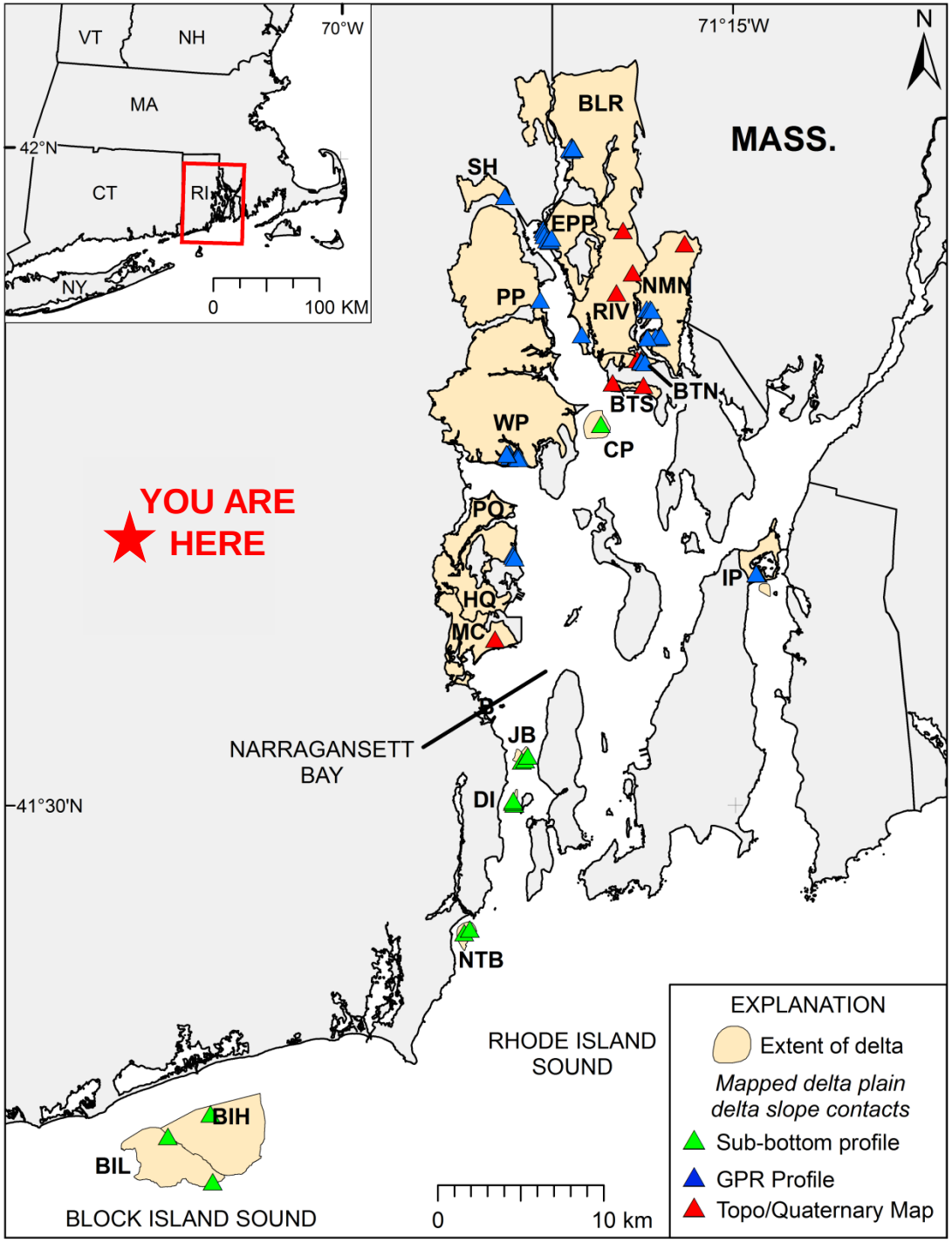
Modified from Stone and Stone, 2005

ISOSTATICALLY UPLIFTED WATER-LEVELS CENTRAL NEW ENGLAND



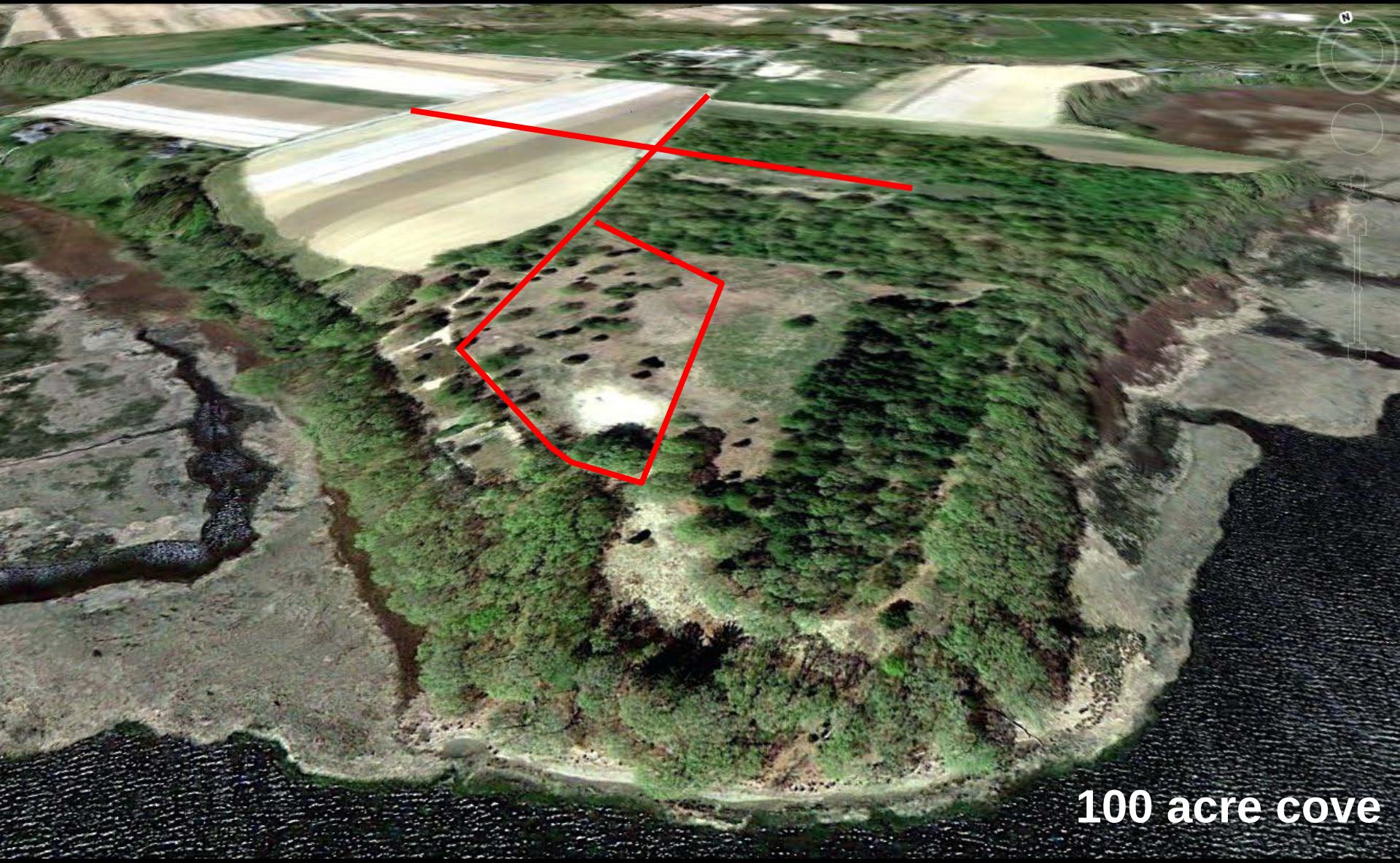
After Koteff and Larsen, 1989 and Koteff et al., 1993

GLACIAL DELTAS:
Narragansett Bay
Rhode Island Sound
Block Island Sound

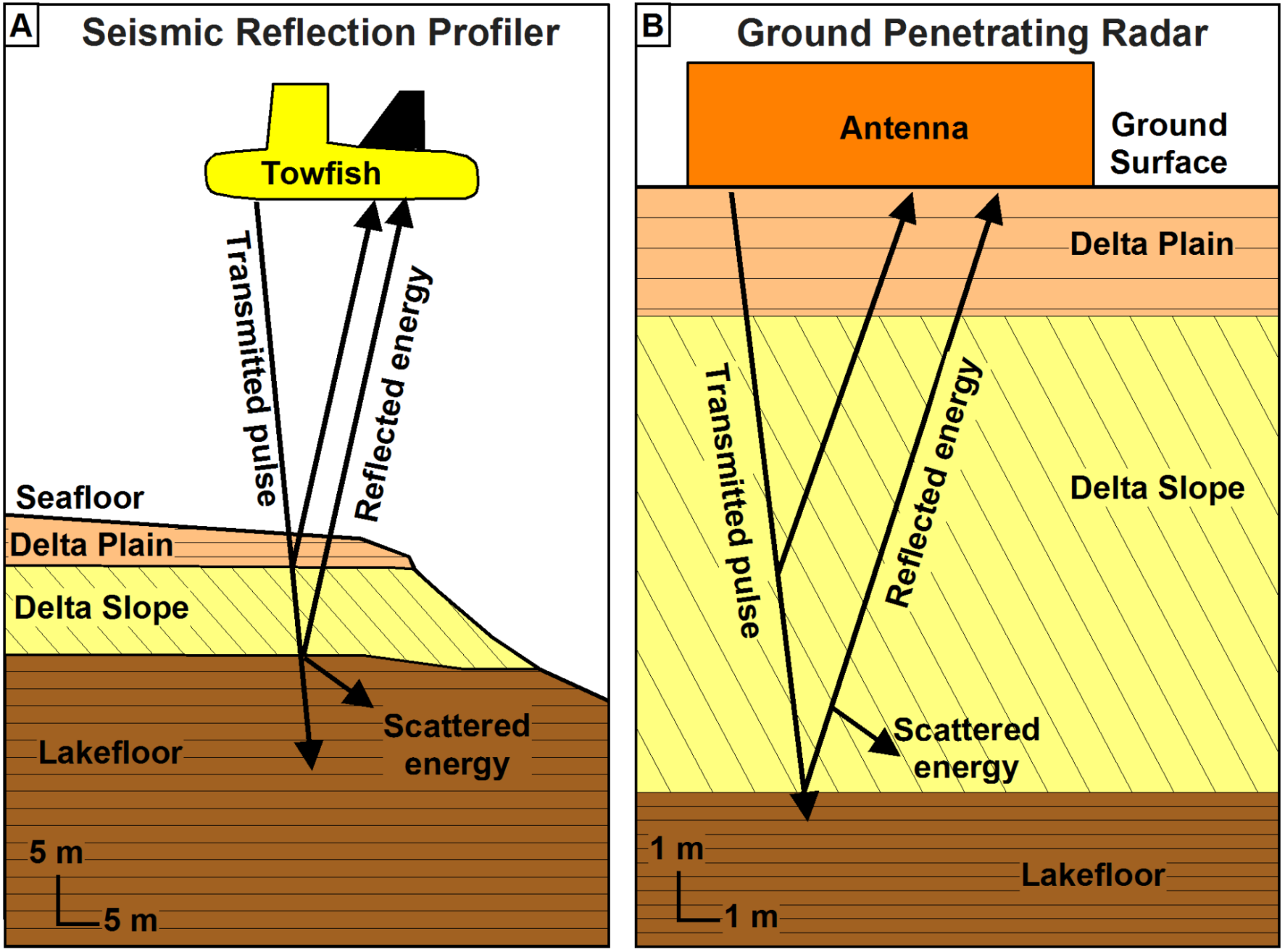


Extent of deltas modified from:
Boothroyd and McCandless, 2004
RIGIS 1989 and this study

NEW MEADOW NECK DELTA



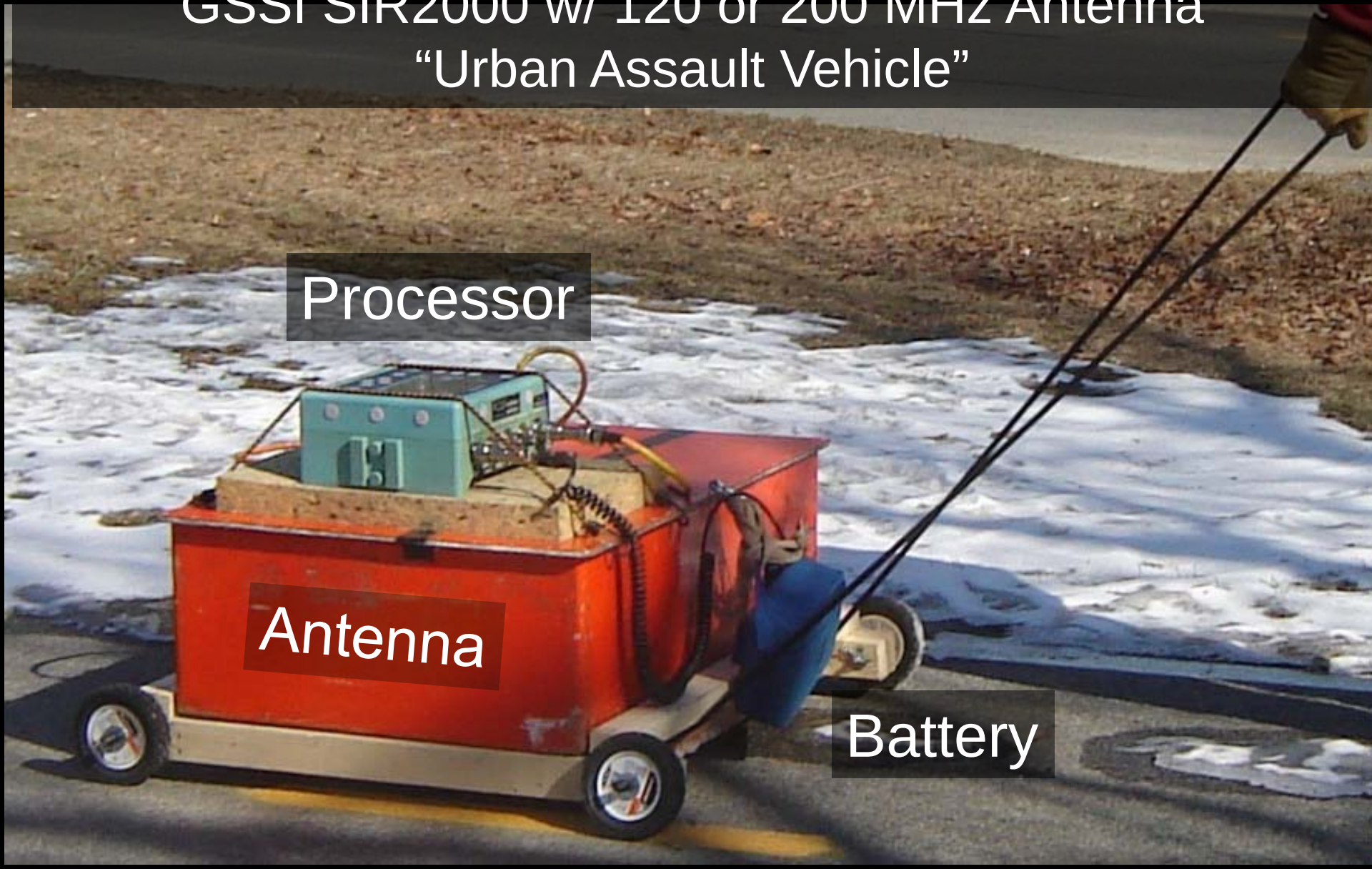
WHERE DID ALL THE OUTCROP GO?


A
Seismic Reflection Profiler
Towfish
Transmitted pulse
Reflected energy
Seafloor
Delta Plain
Delta Slope
Lakefloor
Scattered energy
5 m
5 m
B
Ground Penetrating Radar
Antenna
Ground Surface
Delta Plain
Delta Slope
Transmitted pulse
Reflected energy
Scattered energy
Lakefloor
1 m
1 m

GROUND-PENETRATING RADAR

GSSI SIR2000 w/ 120 or 200 MHz Antenna

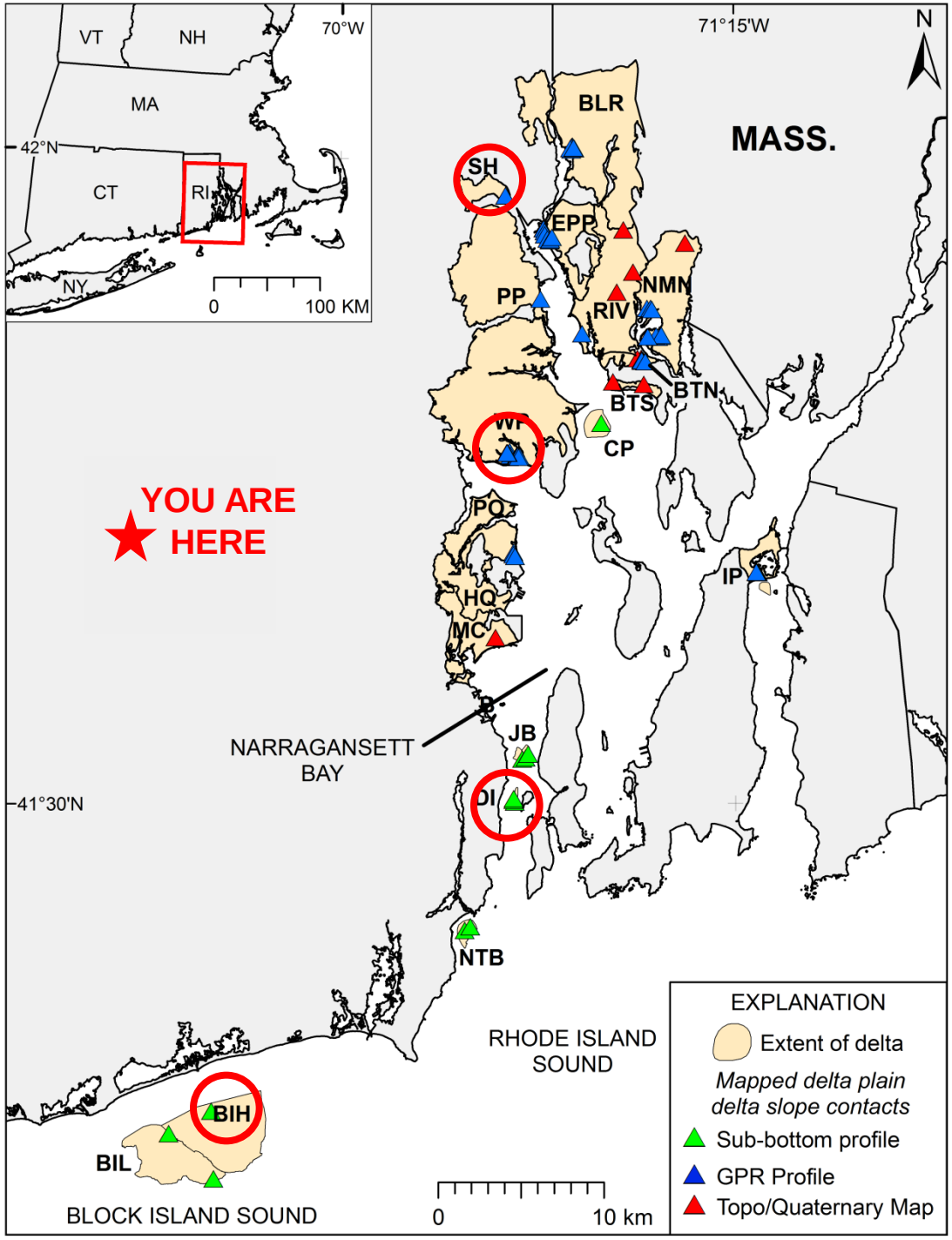
"Urban Assault Vehicle"



GROUND-PENETRATING RADAR

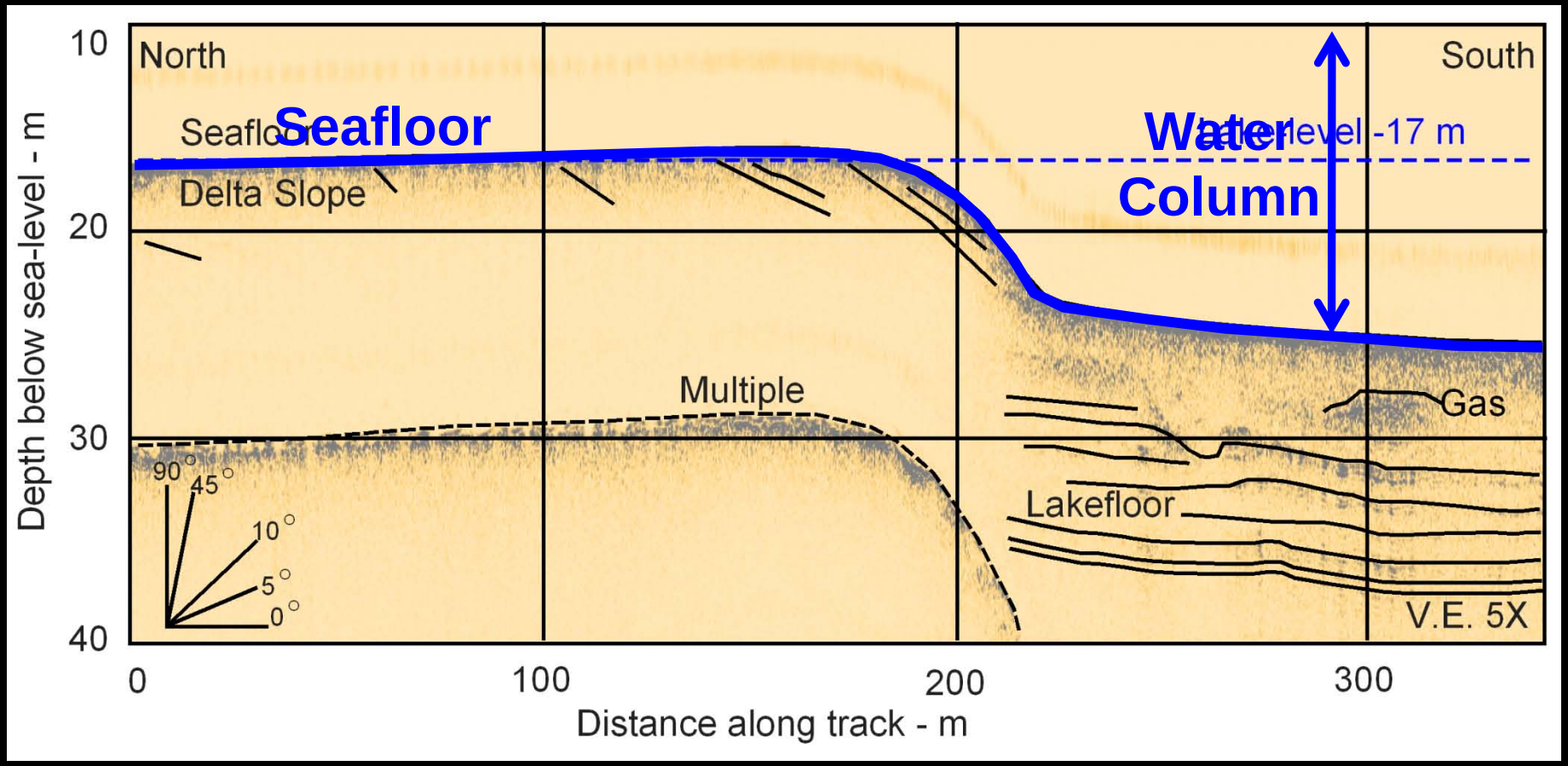
Snow and Ice deployment

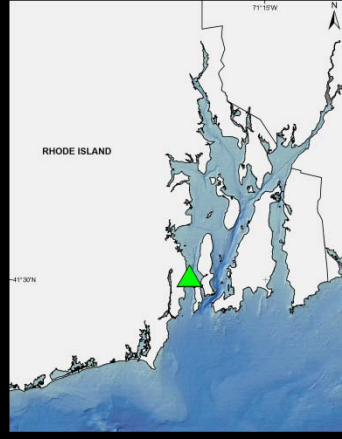
GLACIAL DELTAS:
Narragansett Bay
Rhode Island Sound
Block Island Sound



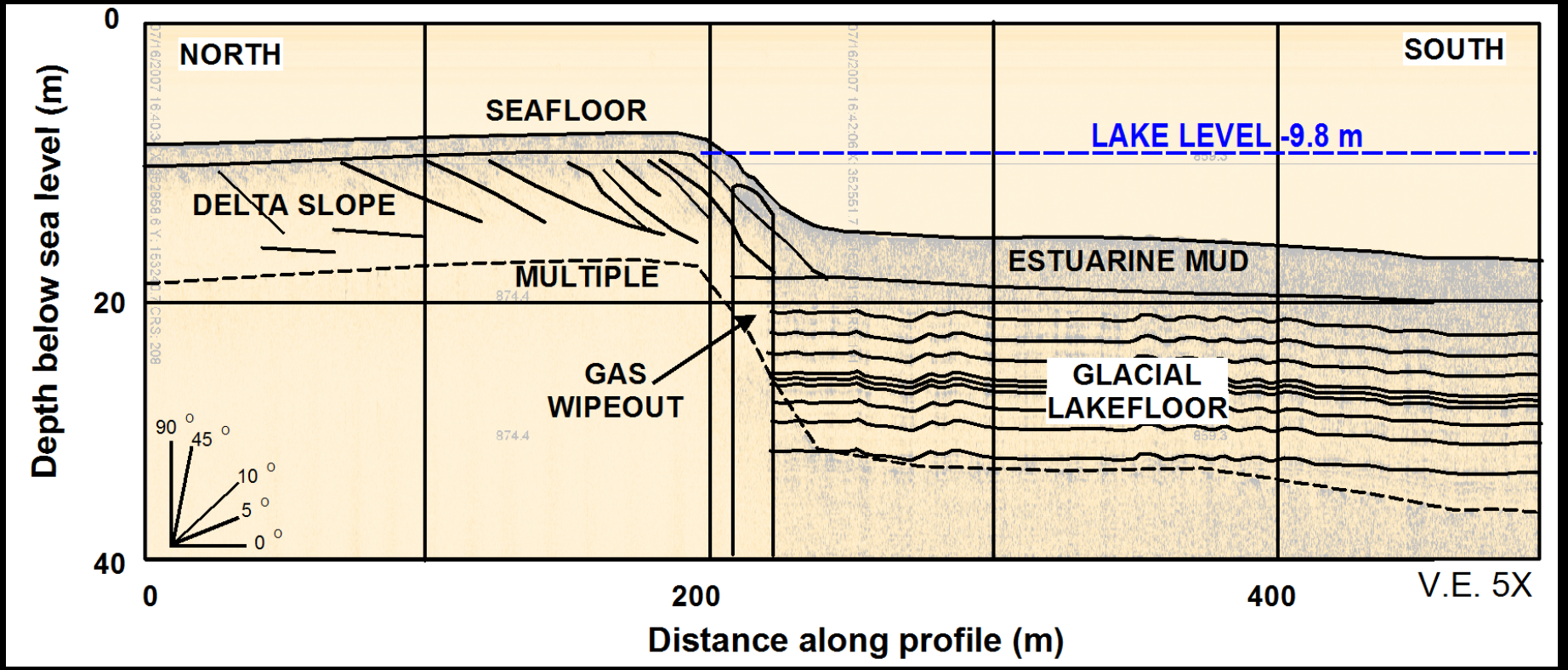
Extent of deltas modified from:
Boothroyd and McCandless, 2004
RIGIS 1989 and this study

Seismic Reflection Profile
Block Island Sound 'High' Delta
17 m below MSL

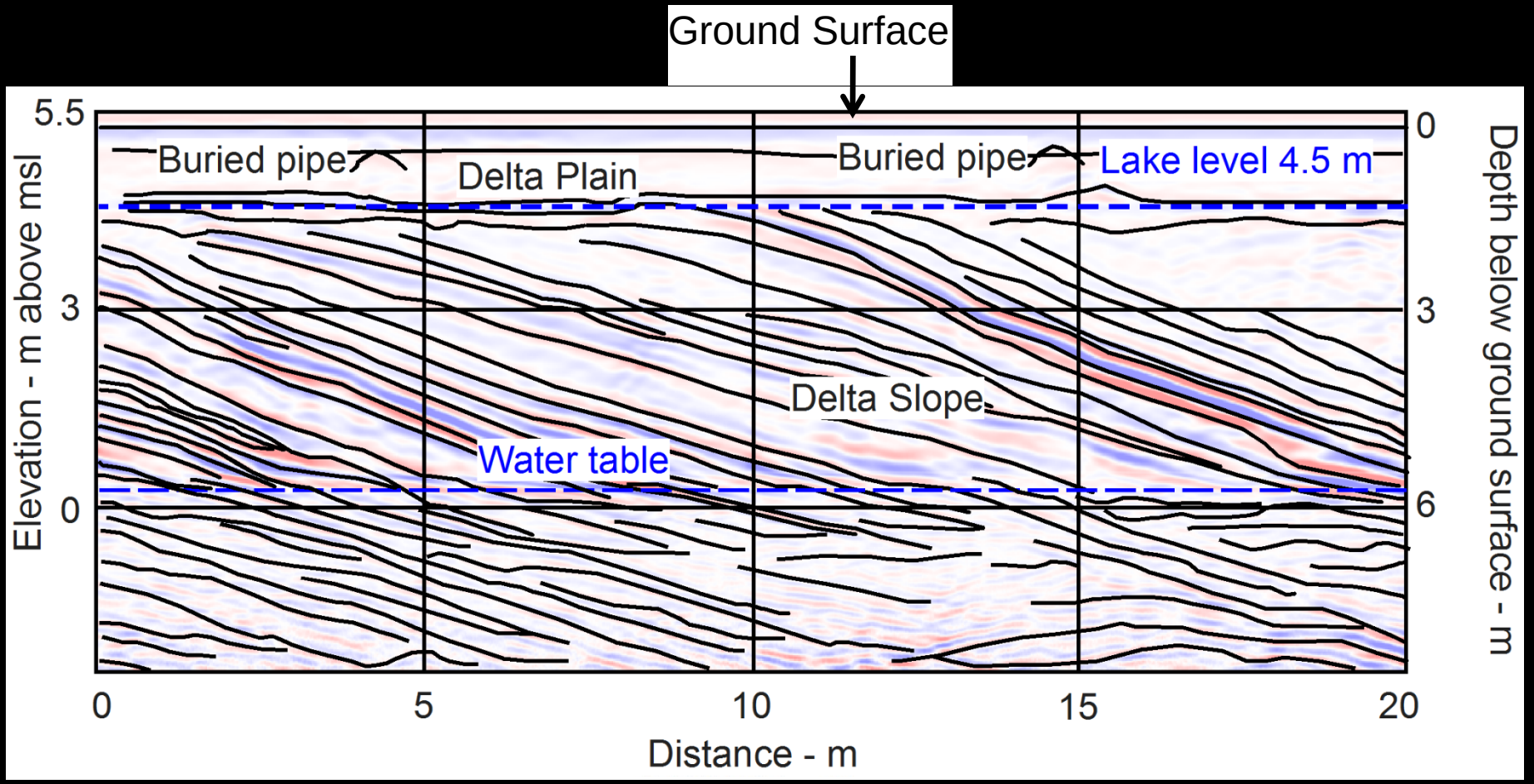




Dutch Island Delta 9.8 m below MSL



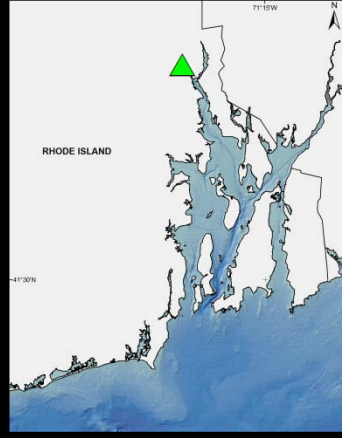
Warwick Plains Delta

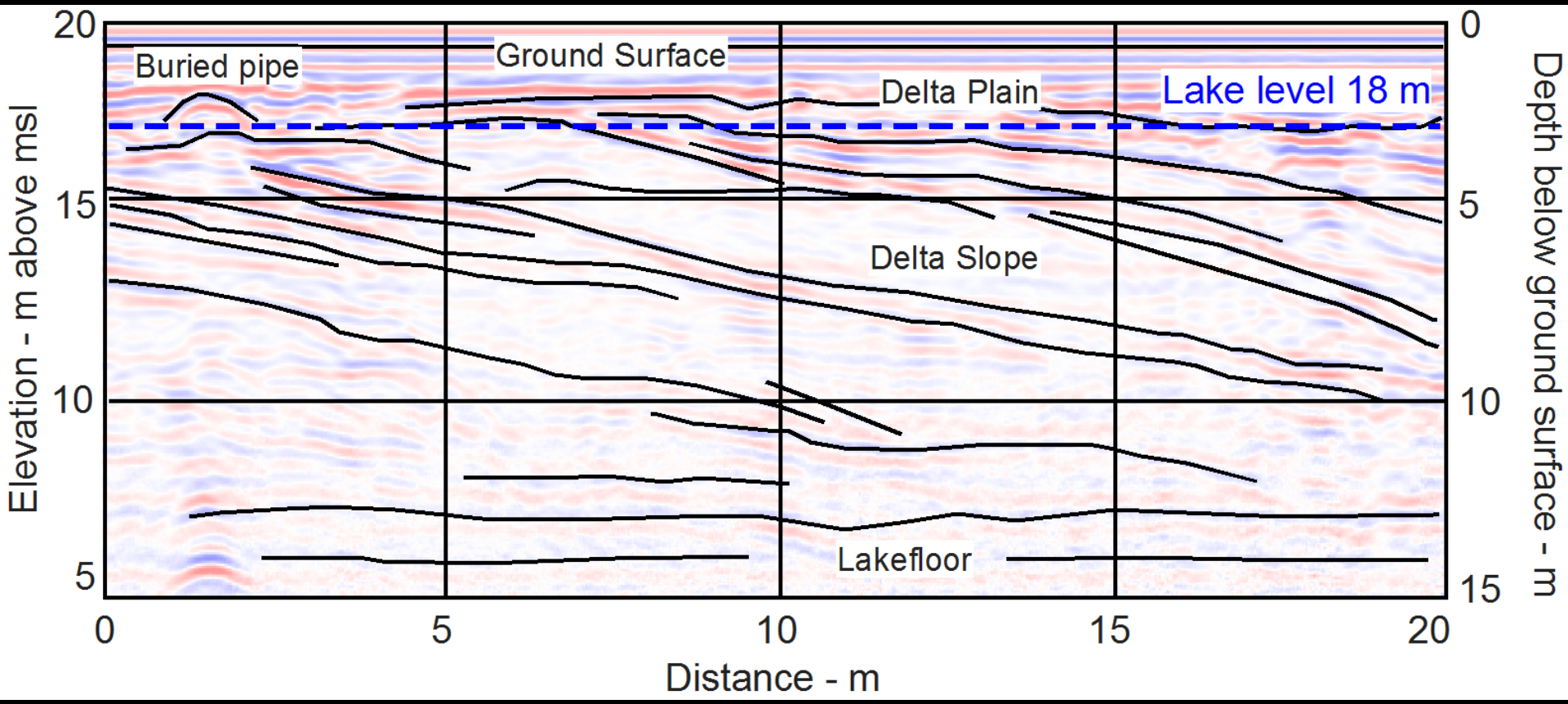


Smith Hill Delta
Providence, RI

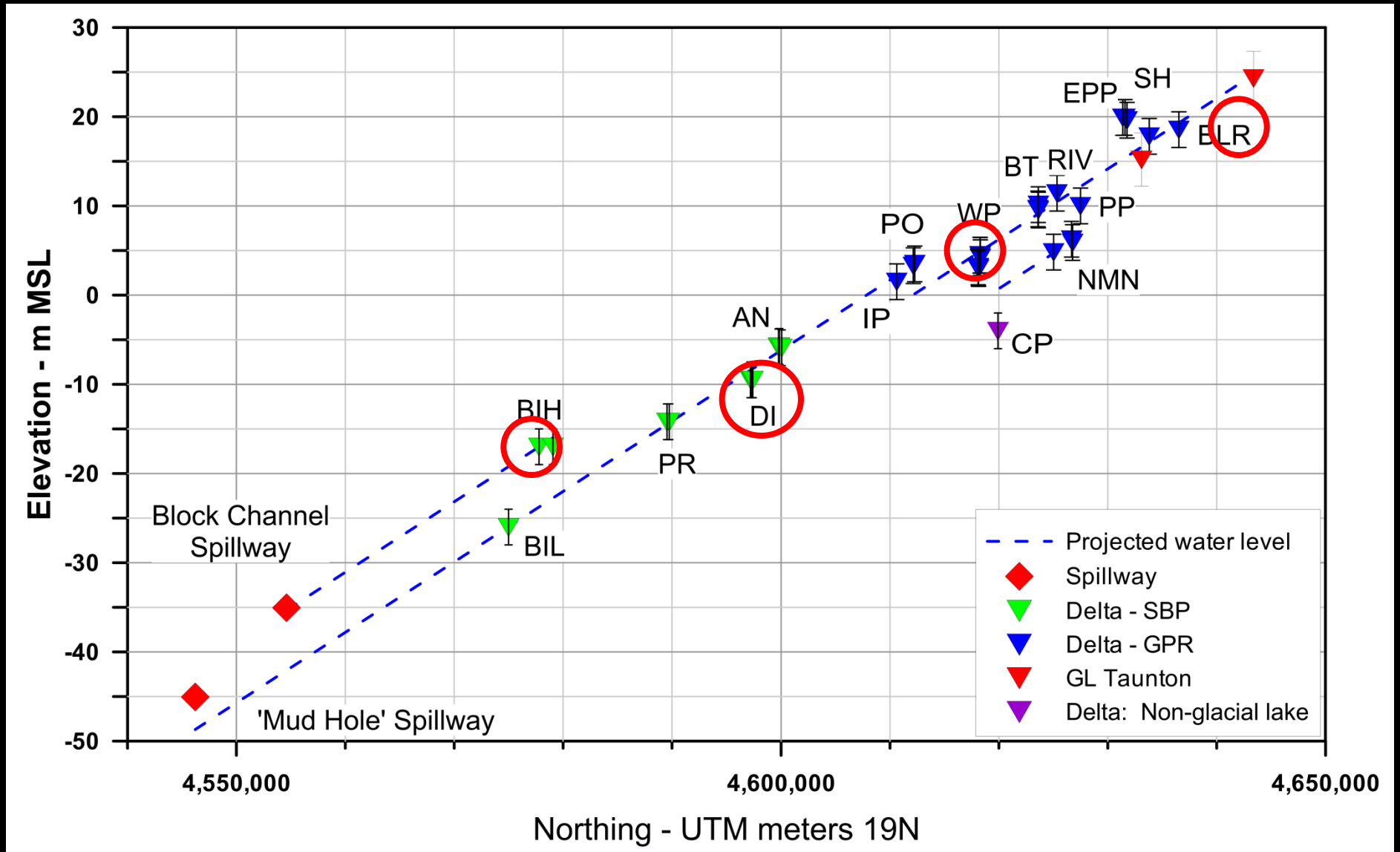
Ground Penetrating Radar Profile

Smith Hill Delta 18 m above MSL

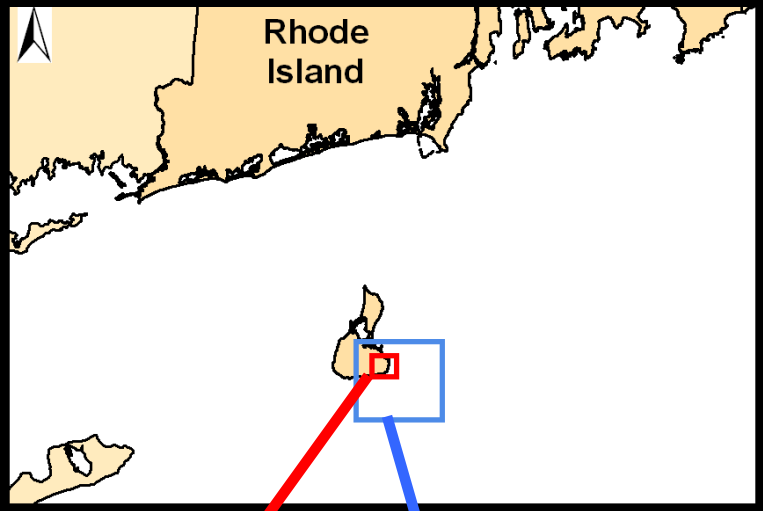




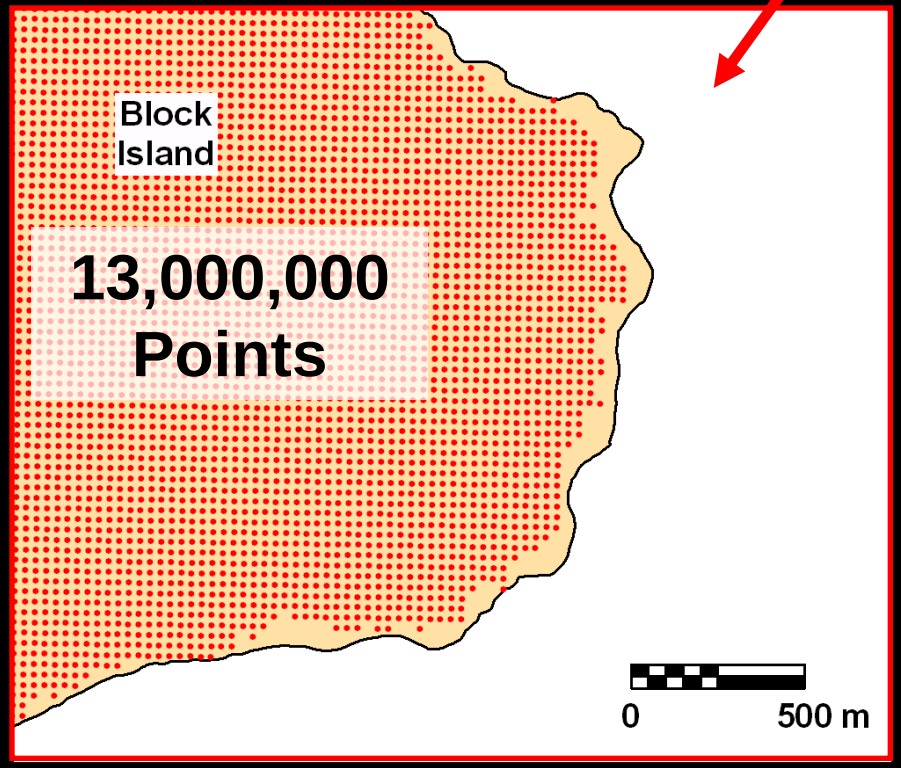
WATER LEVELS
GLACIAL LAKES BLOCK I., RHODE I. AND NARRAGANSETT



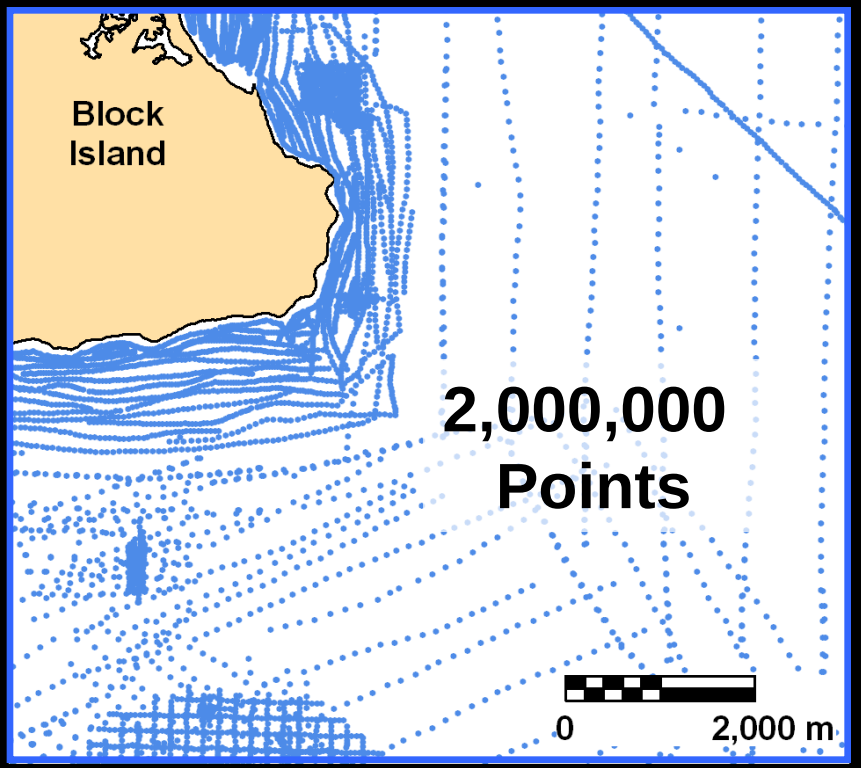
Creating a topobathy model



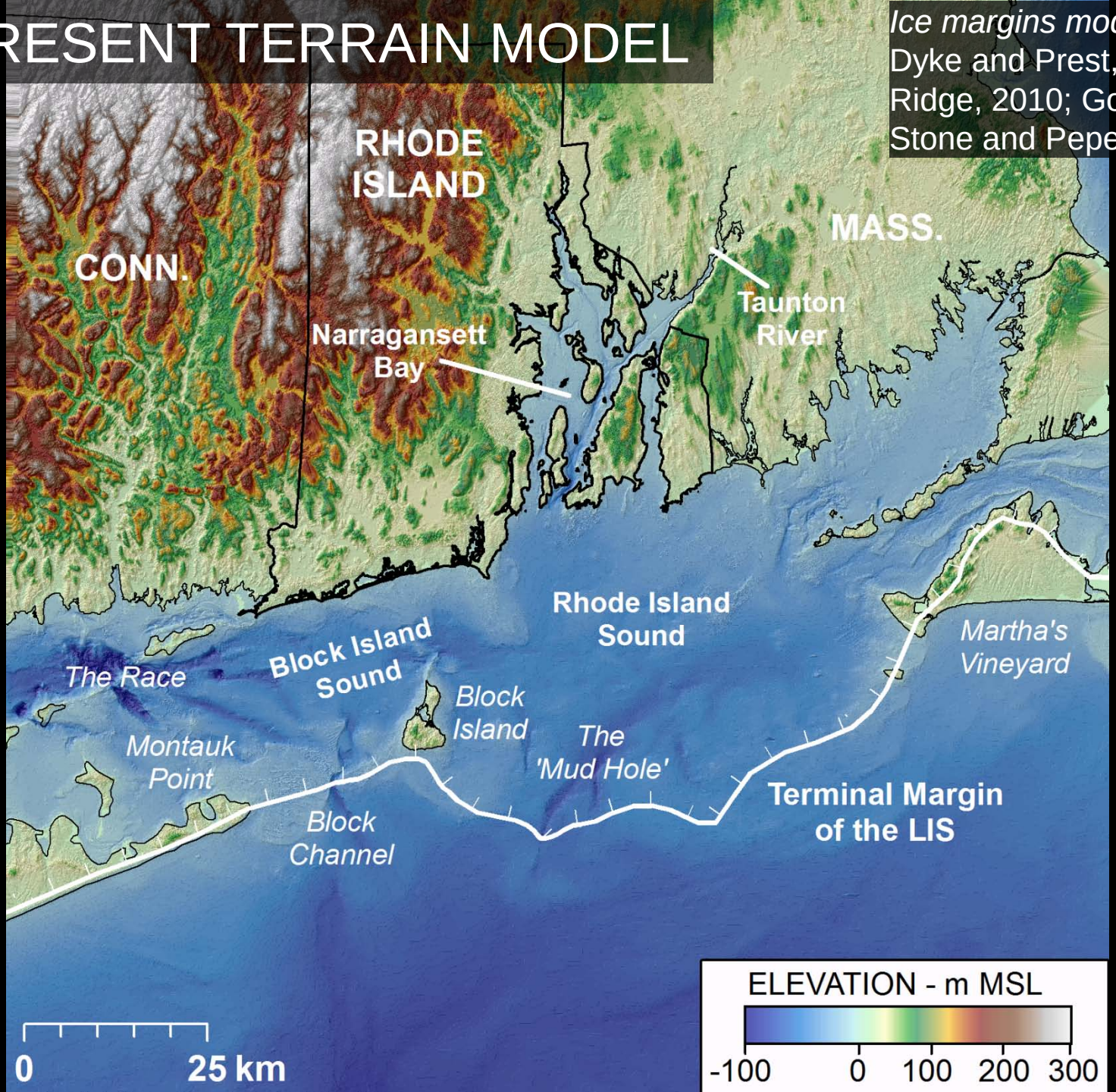
National Elevation Data



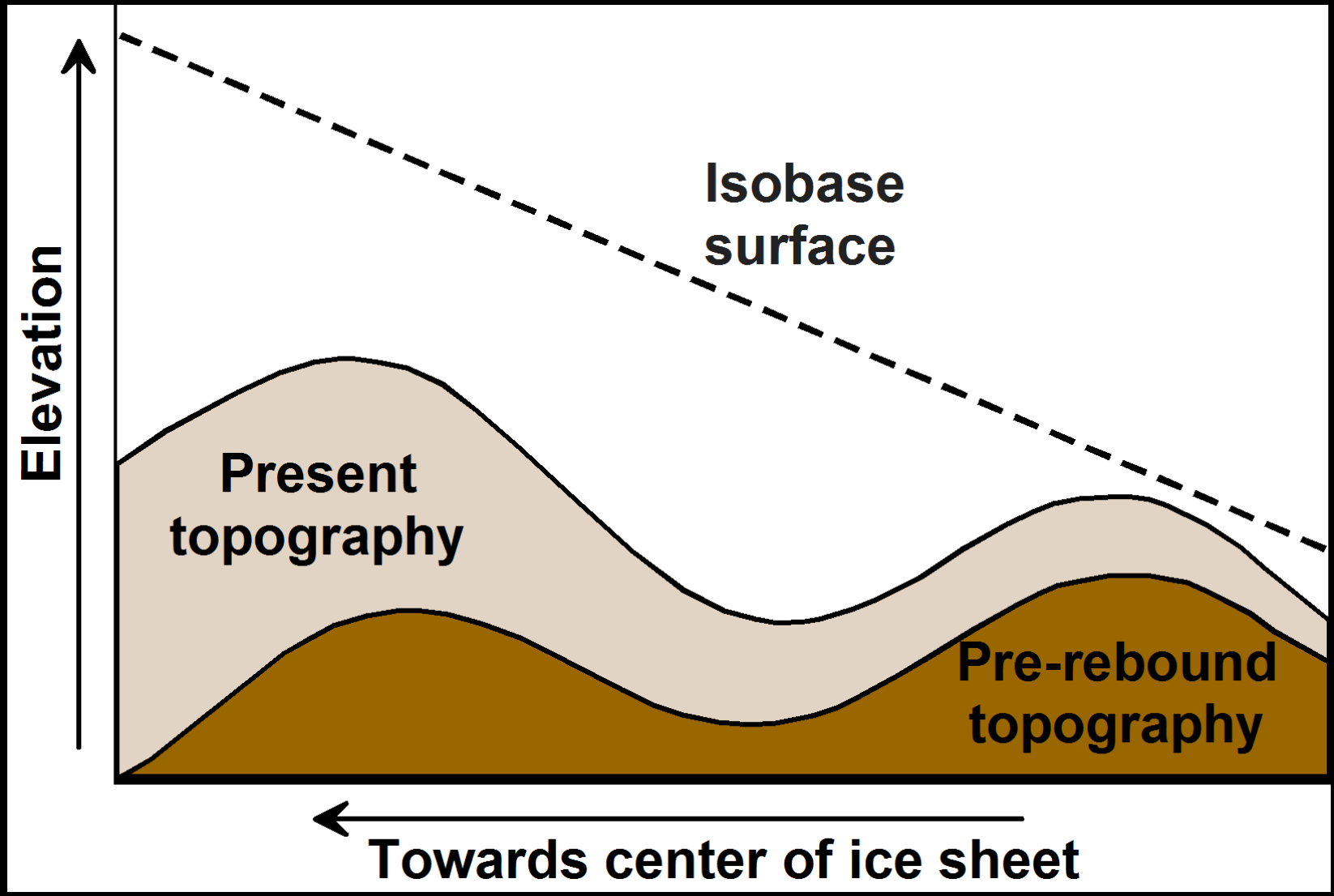
National Ocean Service Data



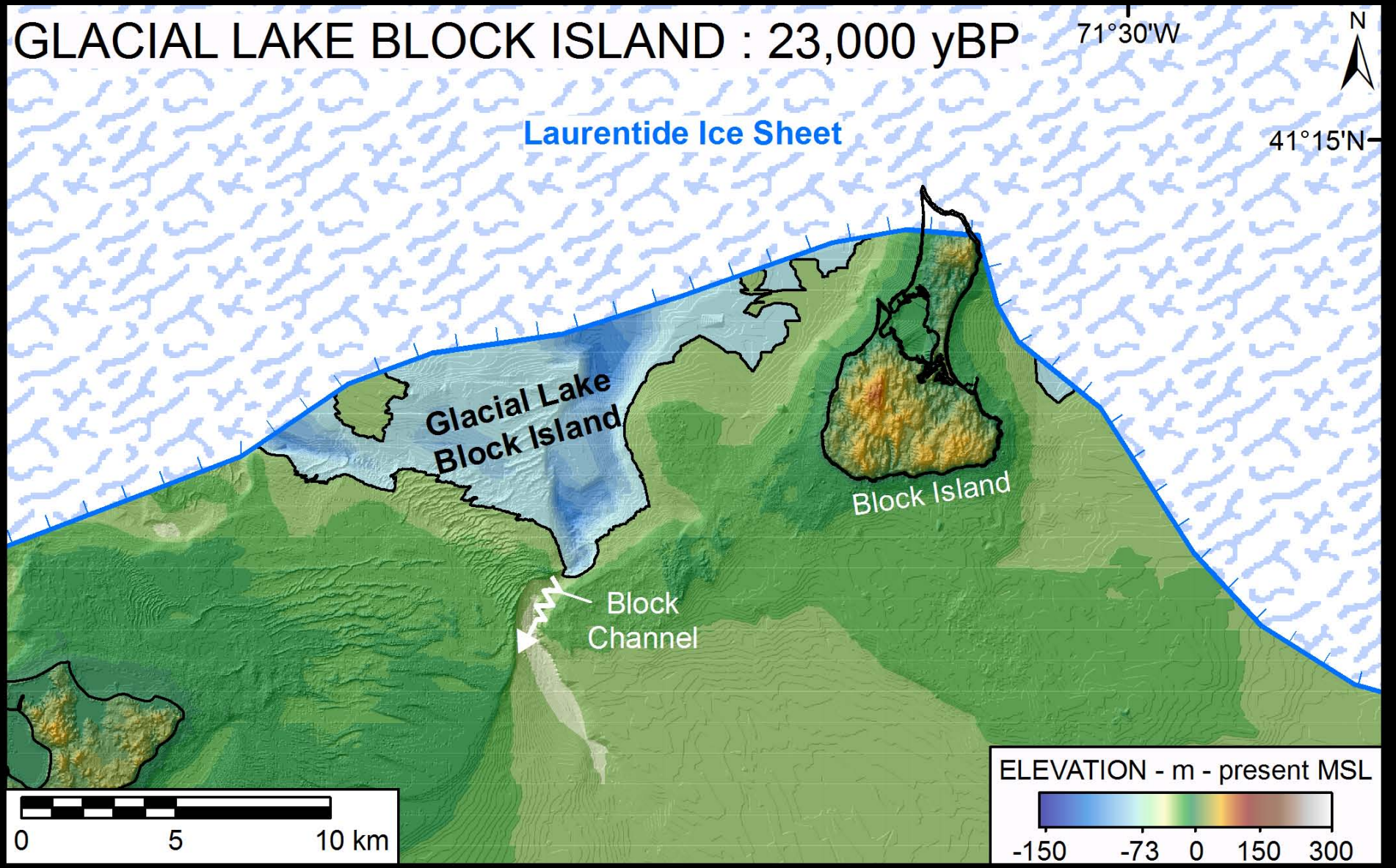
PRESENT TERRAIN MODEL

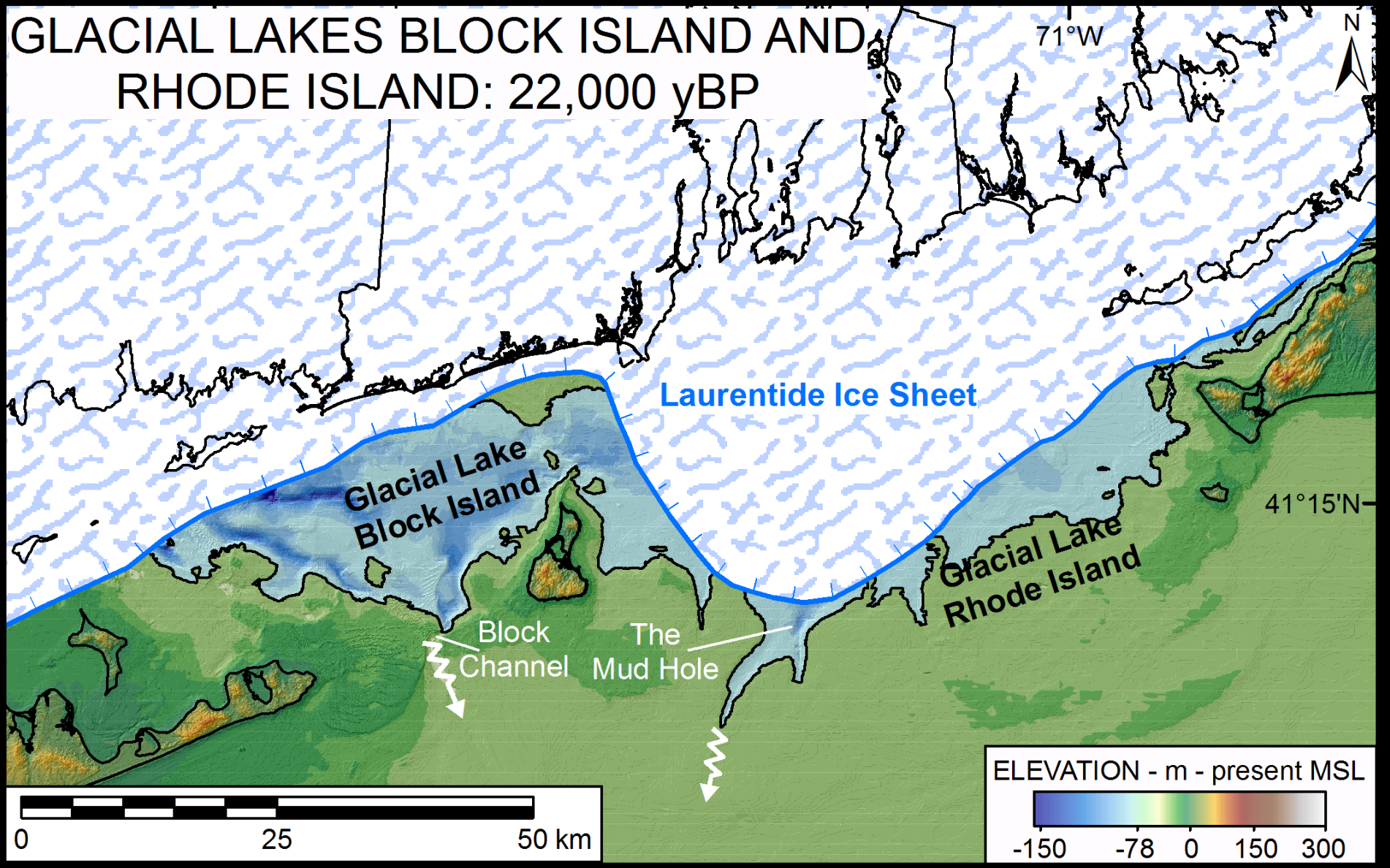


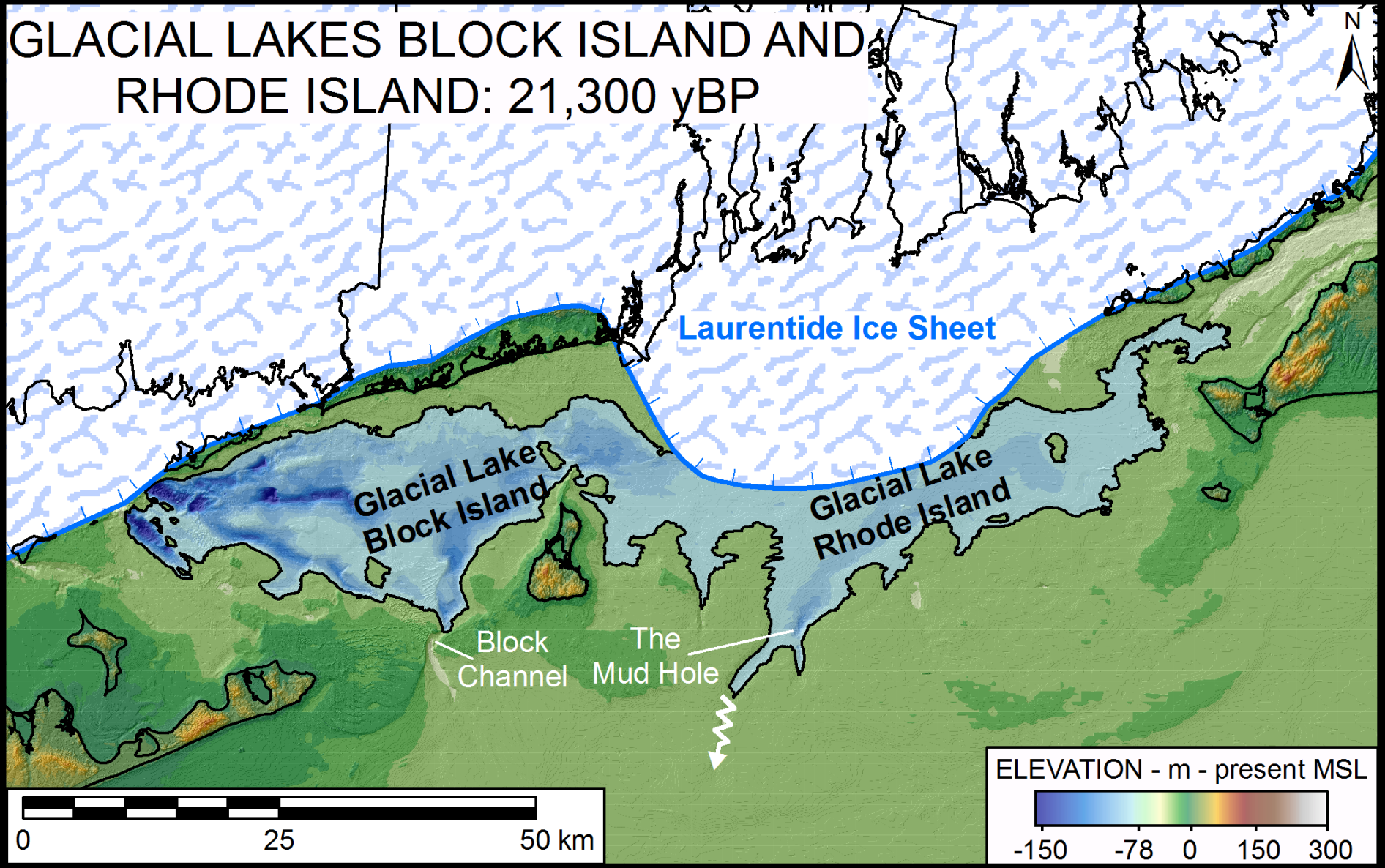
CREATING A PRE-ISOSTATIC REBOUND TERRAIN MODEL

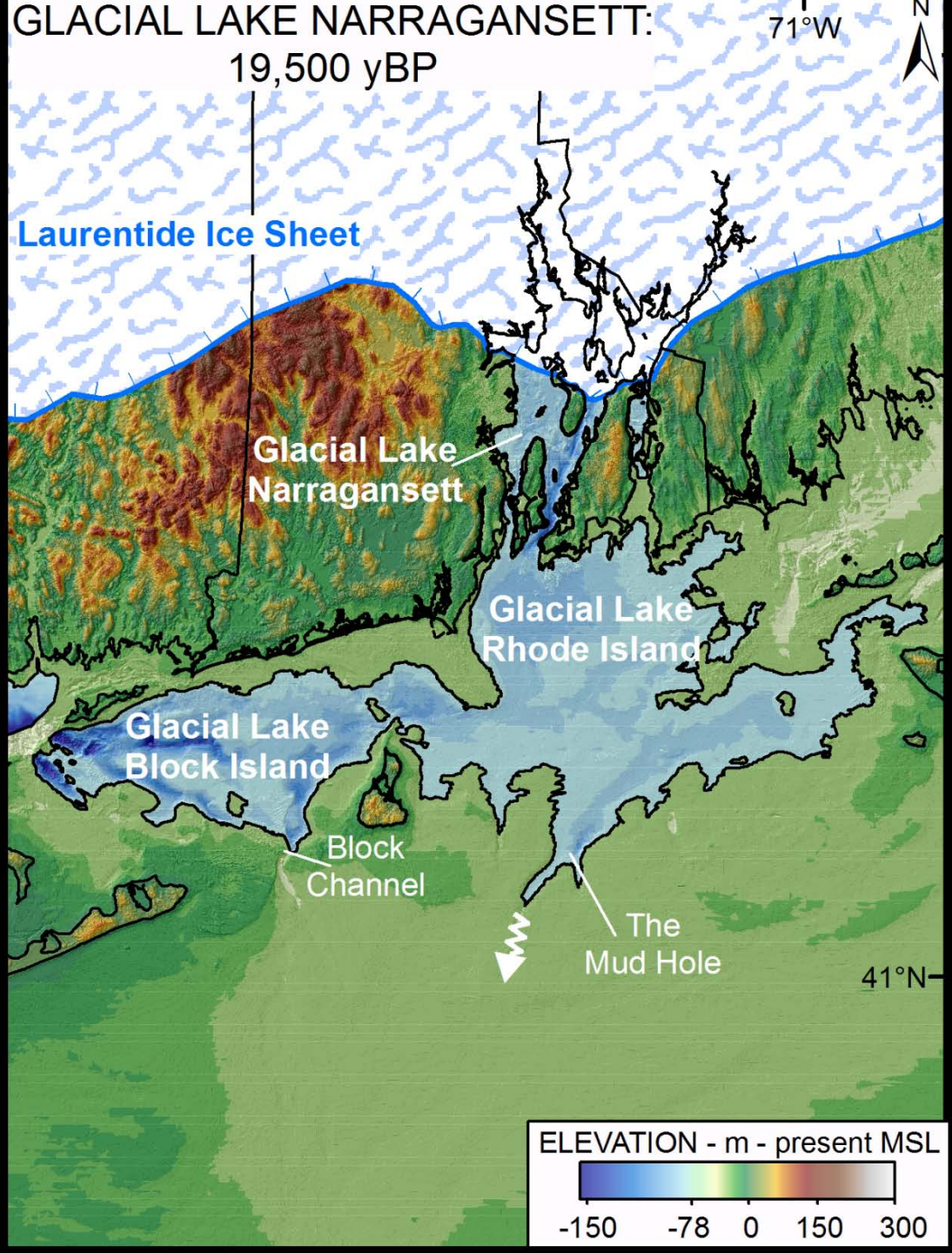


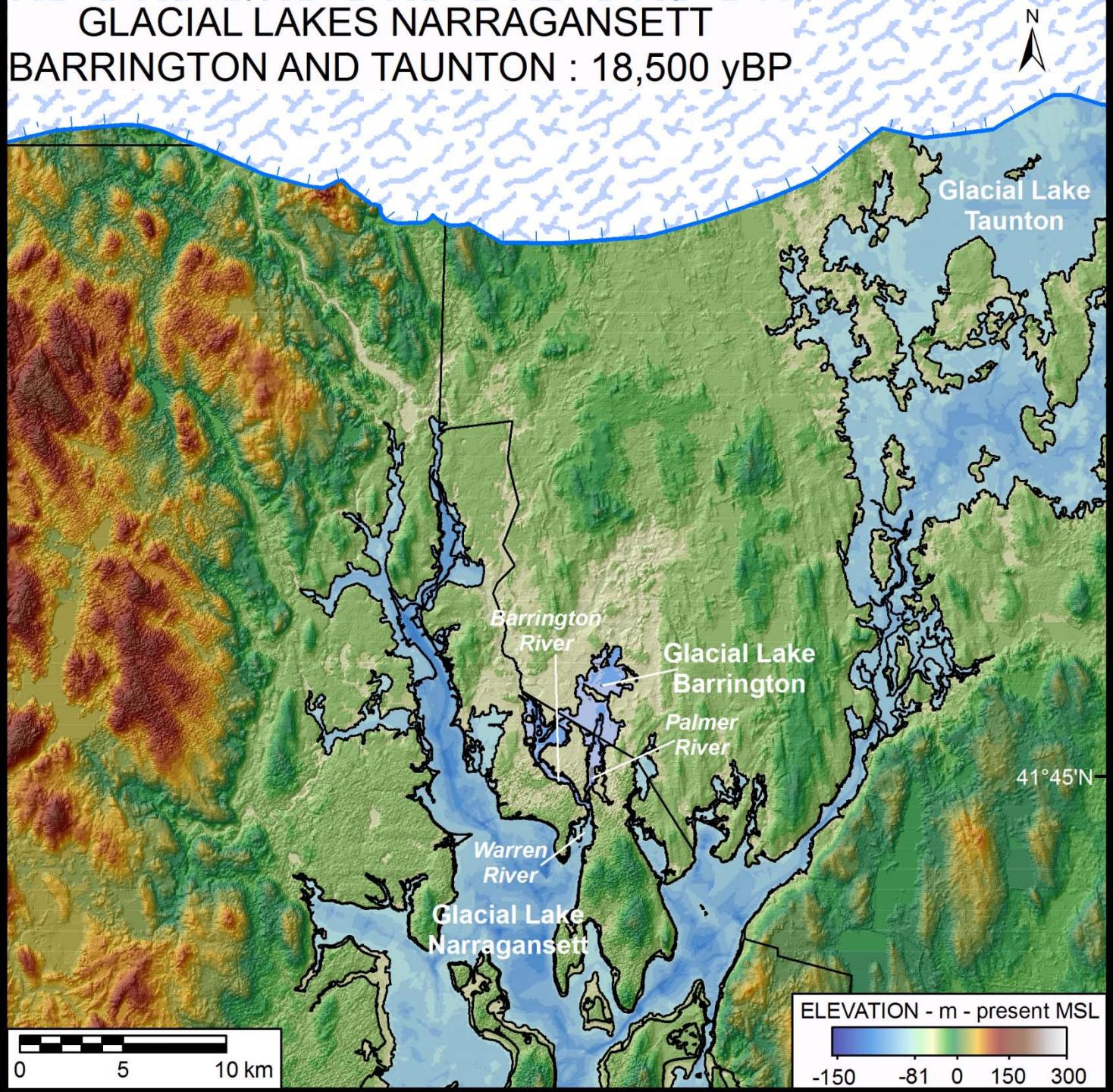
Modified from Leverington (2002)


GLACIAL LAKE BLOCK ISLAND : 23,000 yBP
71°30'W
N
41°15'N
Laurentide Ice Sheet
Glacial Lake
Block Island
Block Island
Block
Channel
0
5
10 km
ELEVATION - m - present MSL
-150
-73
0
150
300

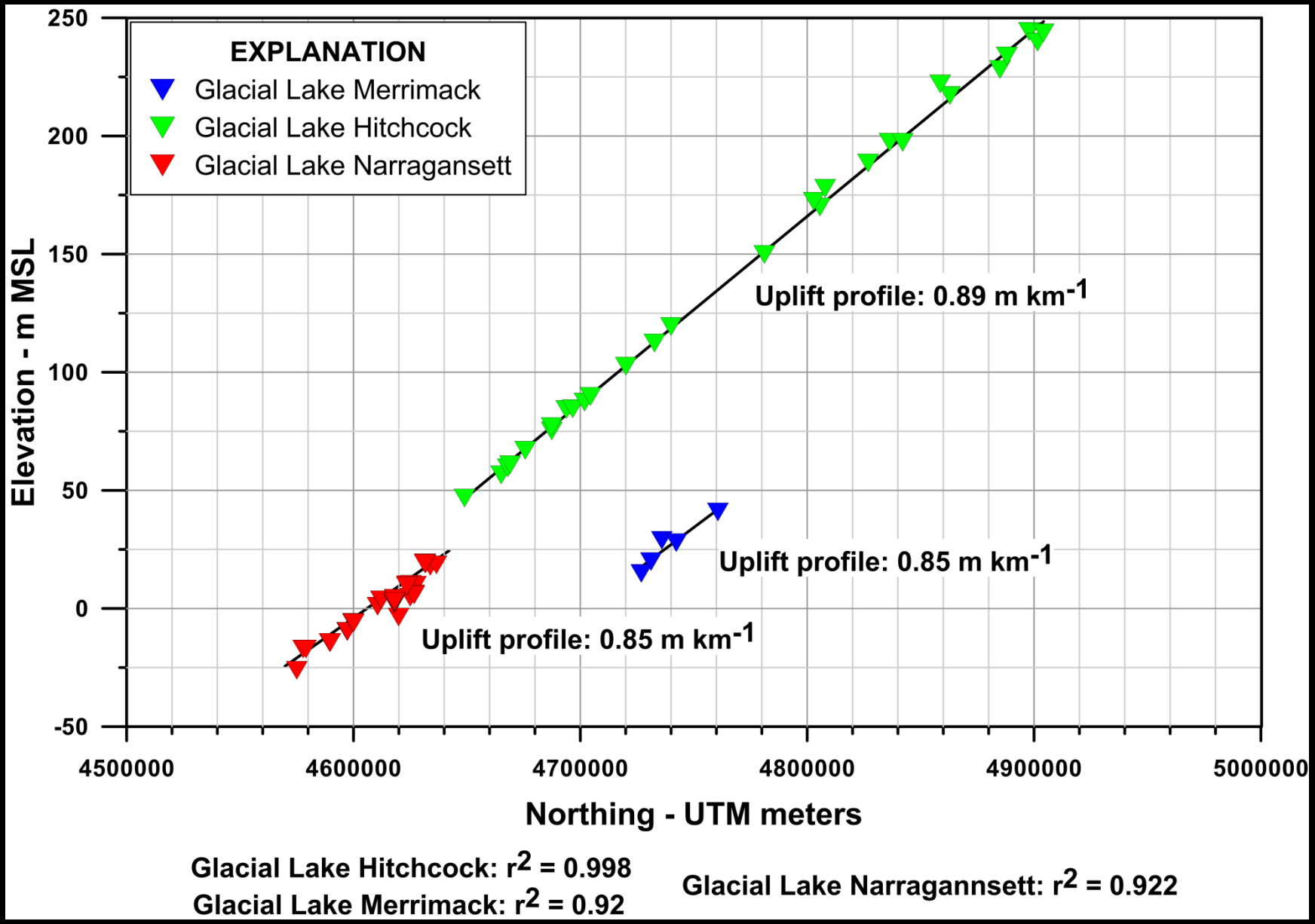

GLACIAL LAKES BLOCK ISLAND AND RHODE ISLAND: 22,000 yBP
71°W
N
Laurentide Ice Sheet
Glacial Lake Block Island
Glacial Lake Rhode Island
41°15'N
Block Channel
The Mud Hole
0
25
50 km
ELEVATION - m - present MSL
-150
-78
0
150
300


GLACIAL LAKES BLOCK ISLAND AND RHODE ISLAND: 21,300 yBP
N
Laurentide Ice Sheet
Glacial Lake Block Island
Glacial Lake Rhode Island
Block Channel
The Mud Hole
0
25
50 km
ELEVATION - m - present MSL
-150
-78
0
150
300


GLACIAL LAKE NARRAGANSETT:
19,500 yBP
71°W
N
Laurentide Ice Sheet
Glacial Lake
Narragansett
Glacial Lake
Rhode Island
Glacial Lake
Block Island
Block
Channel
The
Mud Hole
41°N
ELEVATION - m - present MSL
-150
-78
0
150
300


GLACIAL LAKES NARRAGANSETT
BARRINGTON AND TAUNTON : 18,500 yBP
N
Glacial Lake
Taunton
Barrington
River
Glacial Lake
Barrington
Palmer
River
41°45'N
Warren
River
Glacial Lake
Narragansett
0
5
10 km
ELEVATION - m - present MSL
-150
-81
0
150
300

ISOSTATICALLY UPLIFTED WATER-LEVELS



After Koteff and Larsen, 1989 and Koteff et al., 1993

QUESTIONS?

ACKNOWLEDGEMENTS

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