

WATER-LEVELS OF GLACIAL LAKE NARRAGANSETT DETERMINED USING GROUND PENETRATING RADAR

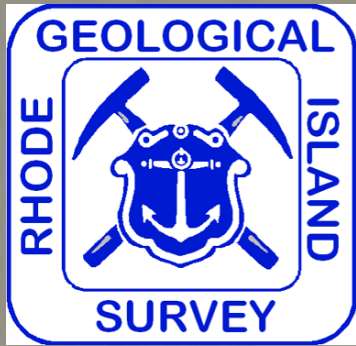
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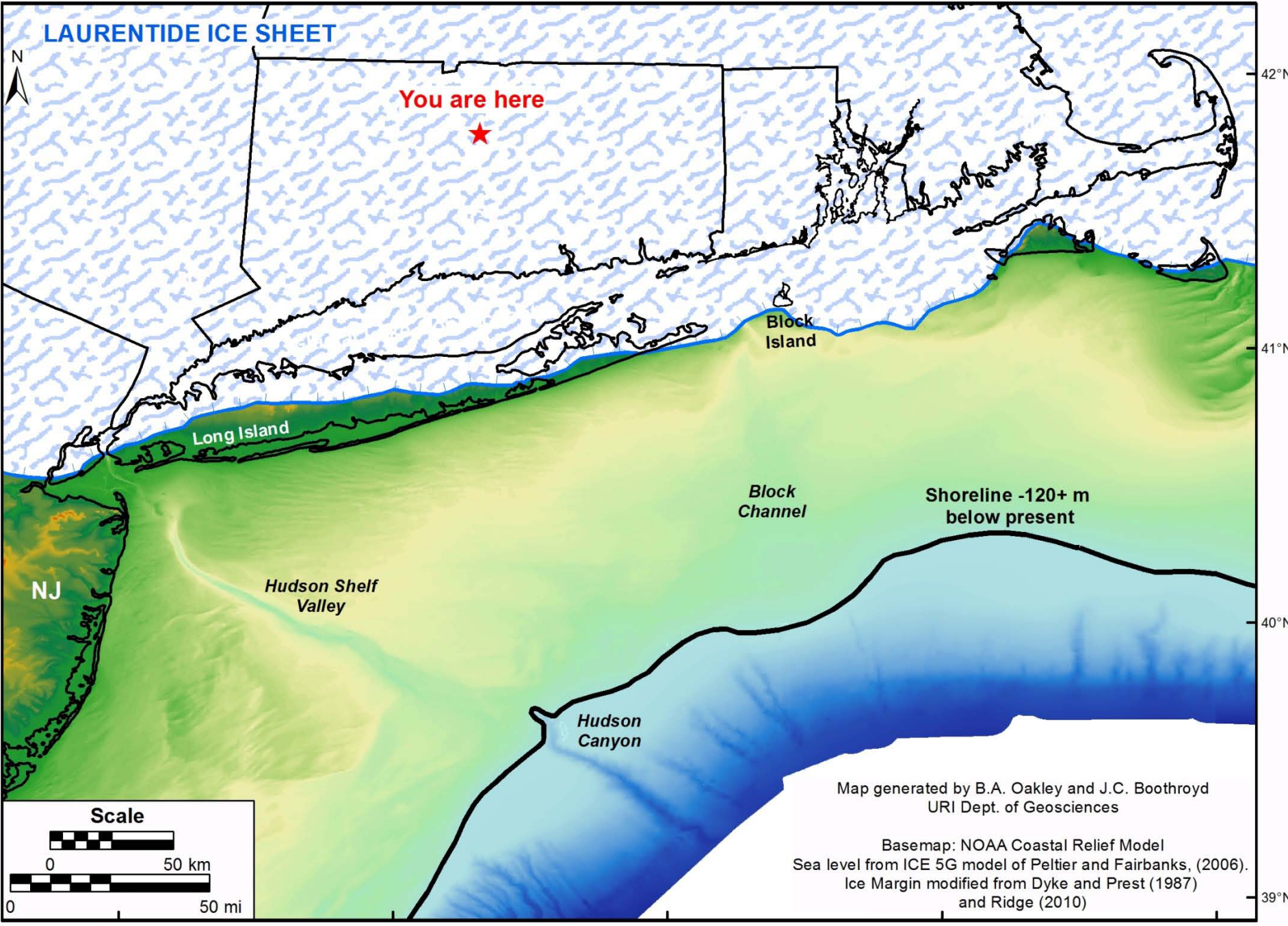
**Northeast meeting of the Geological Society of America
March 19th, 2012
Hartford, CT**



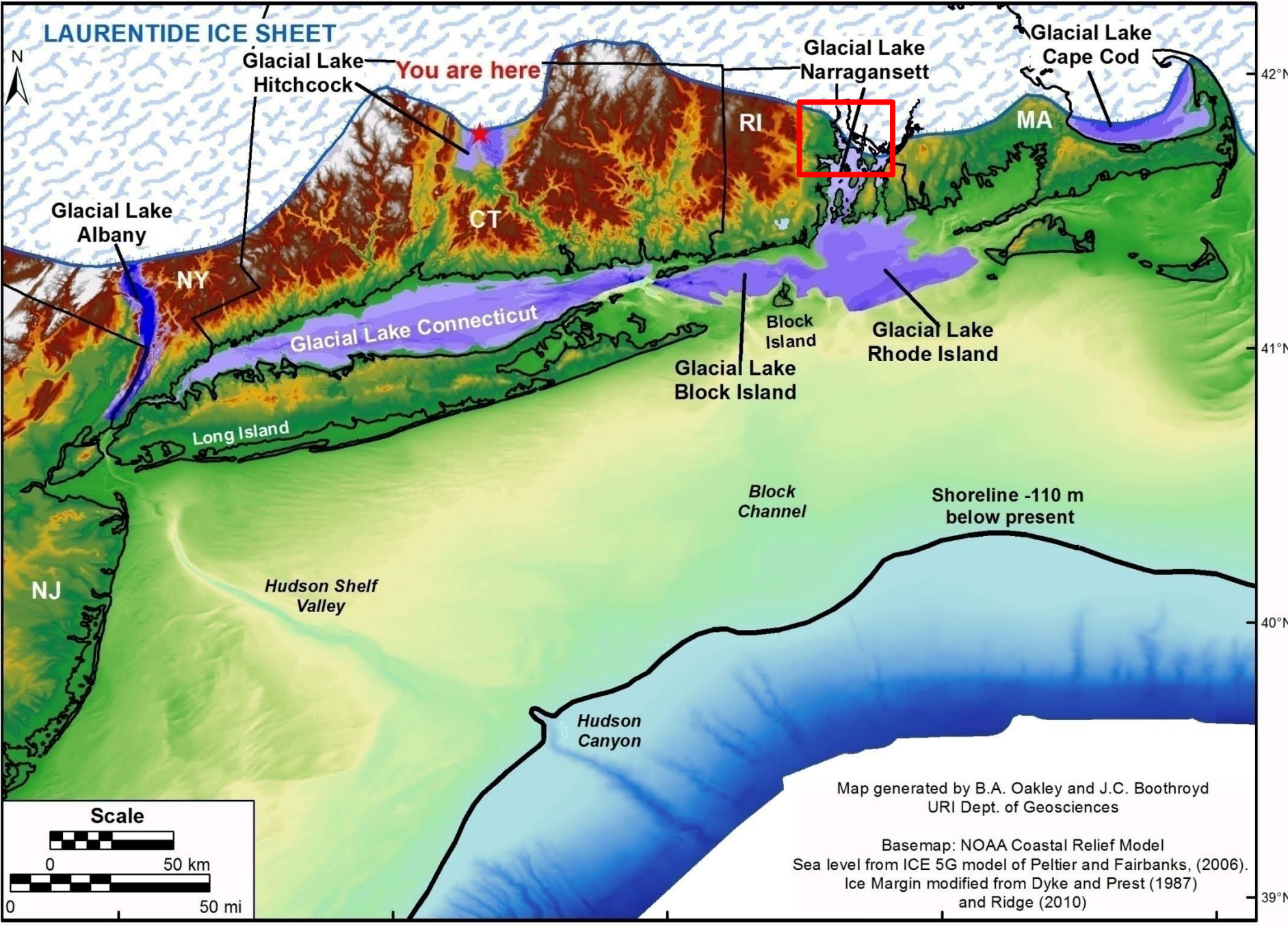
OUTLINE

- Study area and glacial deltas
- Methods
- Present elevation of deltas and water-levels
- Projected extent of Glacial Lakes
Narragansett Block Island, and Rhode Island

SOUTHERN NEW ENGLAND AND EASTERN NEW YORK AT THE LAST GLACIAL MAXIMUM: 26,000 yBP



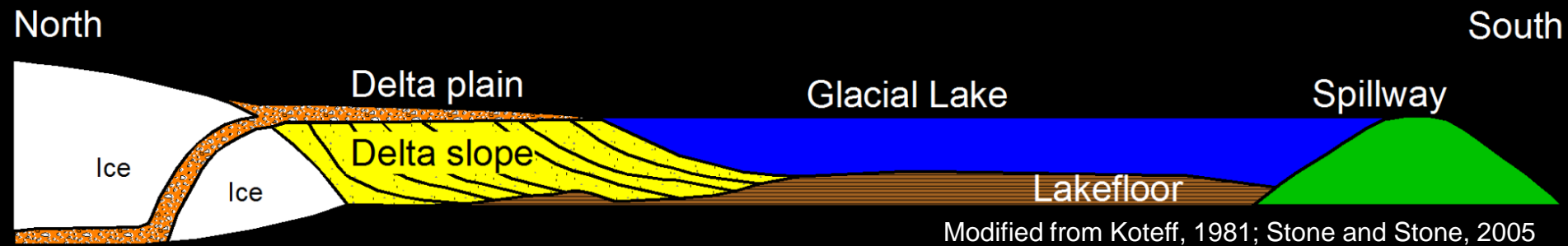
GLACIAL LAKES OF SOUTHERN NEW ENGLAND AND EASTERN NEW YORK



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)

ICE-MARGINAL DELTA MORPHOSEQUENCE



WHERE DID ALL THE OUTCROP GO?



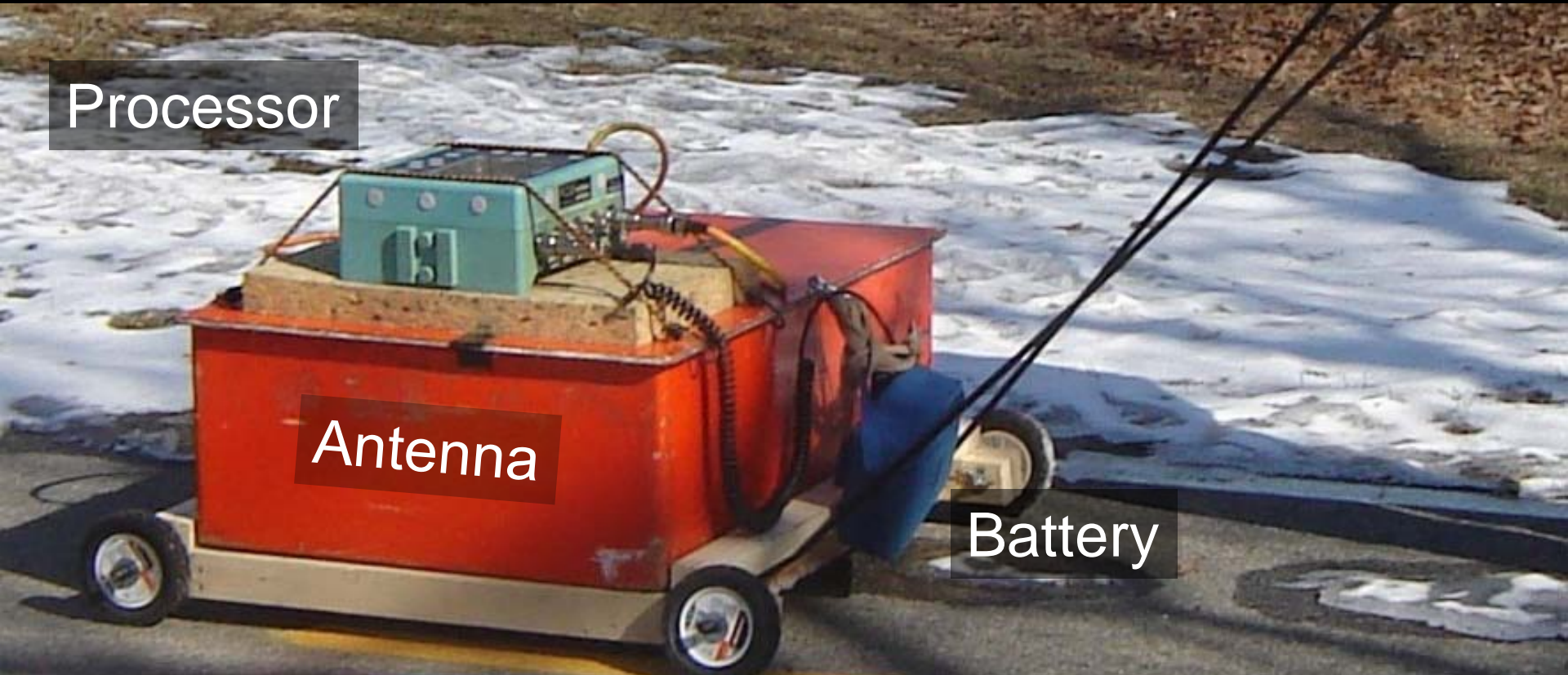
GROUND-PENETRATING RADAR

GSSI SIR2000 w/ 120 or 200 MHz Antenna

Processor

Antenna

Battery



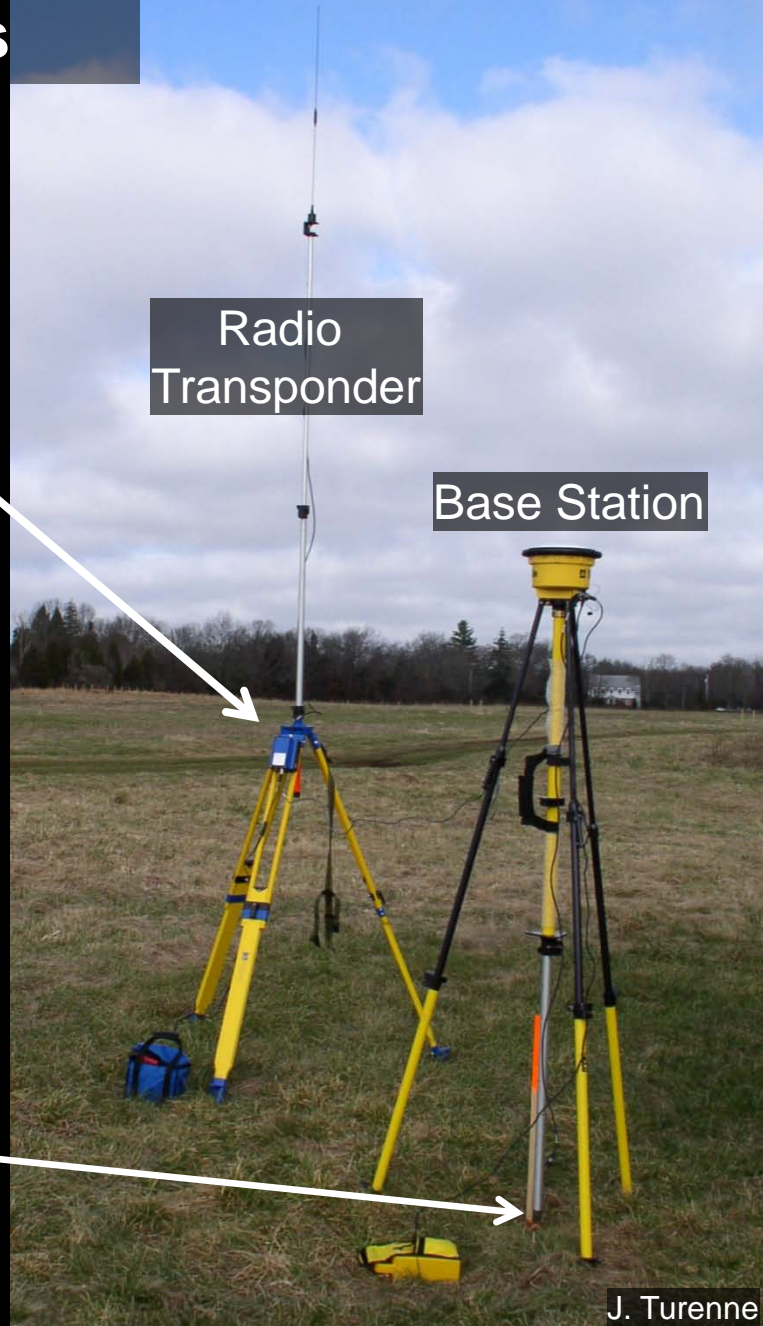
REAL-TIME KINEMATIC GPS

Ground Surface Elevations



"Rover"

Radio link



Radio Transponder

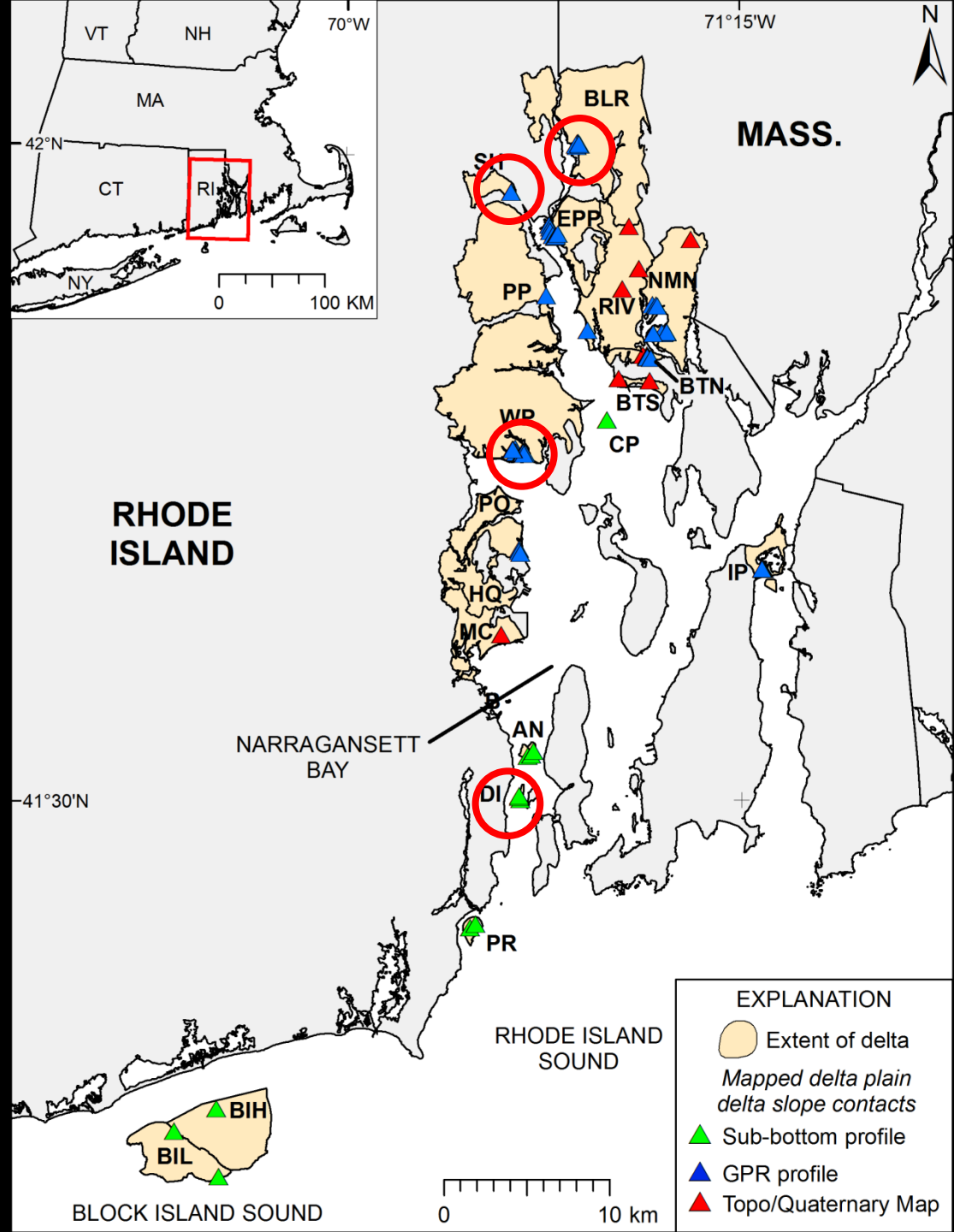
Base Station

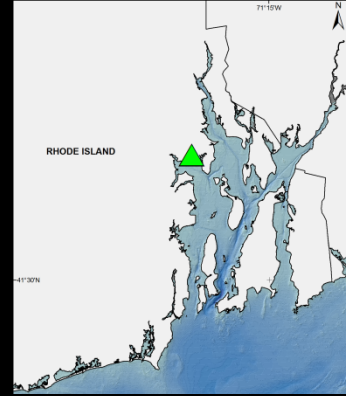


Temporary benchmark

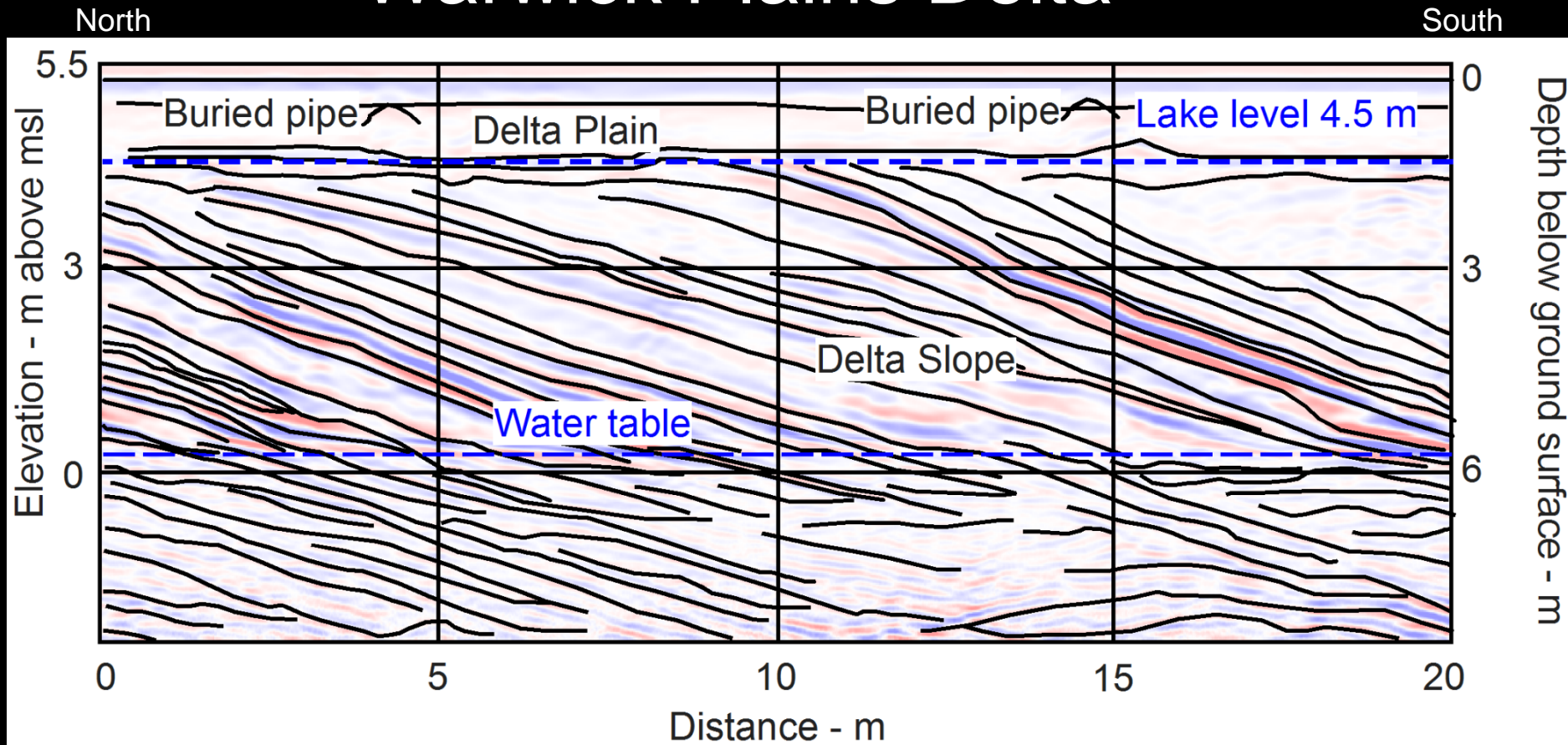
GLACIAL DELTAS: Narragansett Bay Rhode Island Sound Block Island Sound

Extent of deltas modified from:
Boothroyd and McCandless, 2004
RIGIS 1989 and this study
Figure from Oakley and Boothroyd:
In prep.



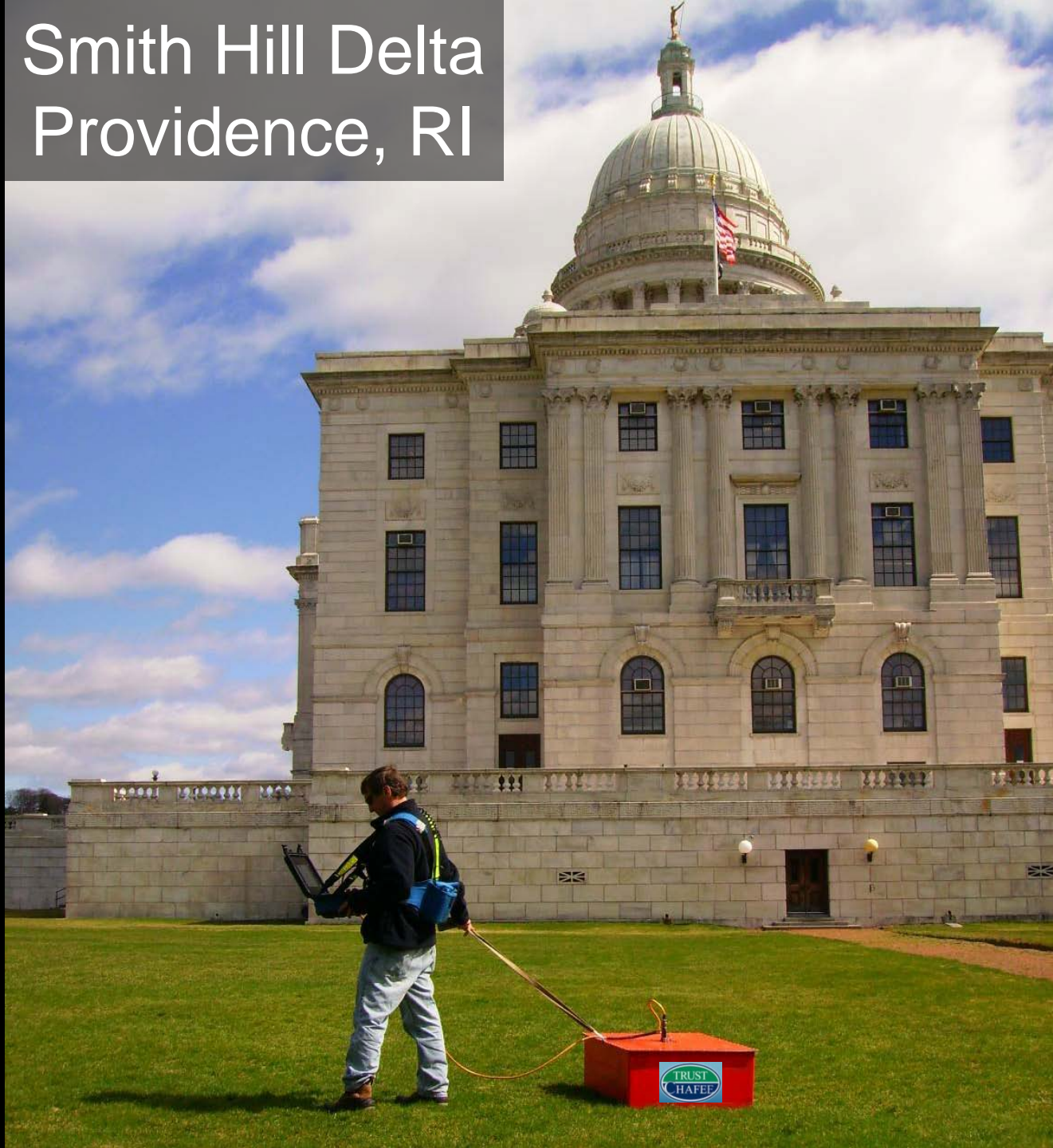


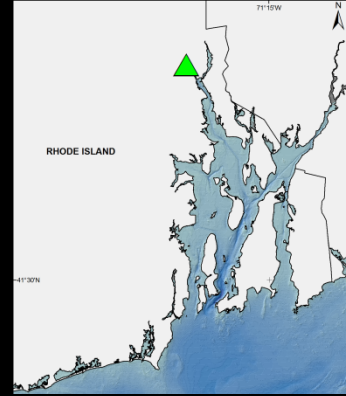
Warwick Plains Delta



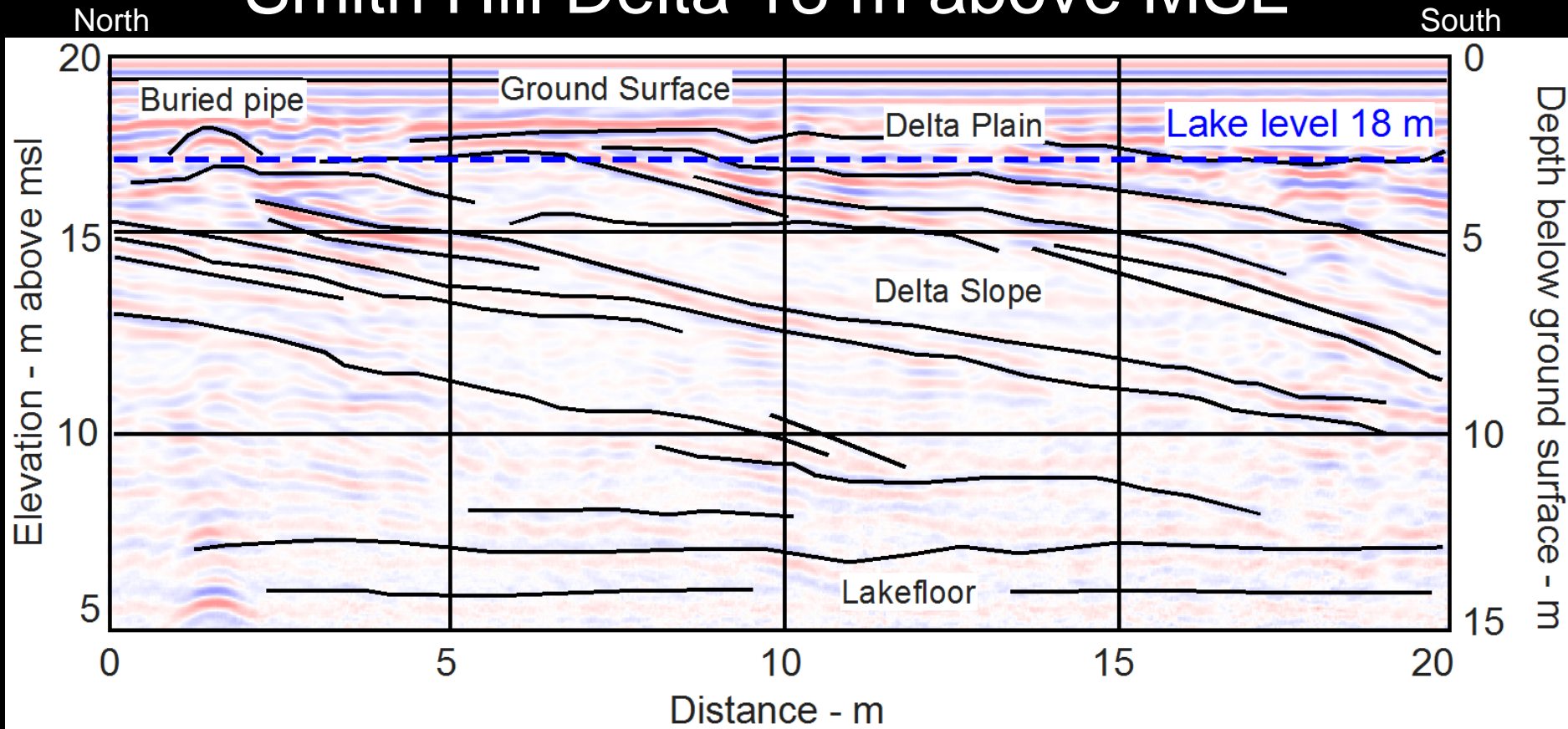
Collected with a 200 MHz GSSI Antenna

Smith Hill Delta Providence, RI



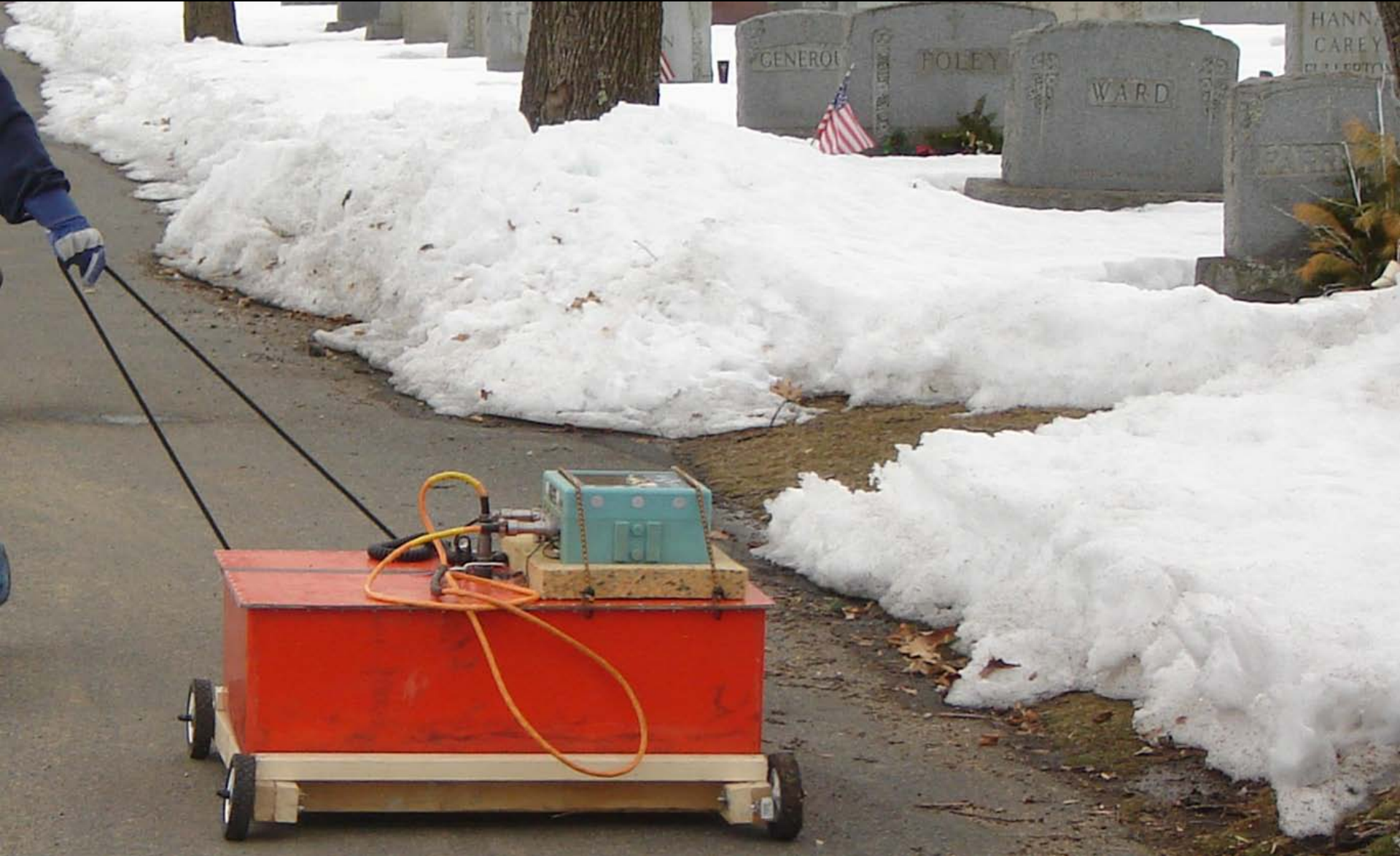


Smith Hill Delta 18 m above MSL



Collected with a 120 MHz GSSI Antenna

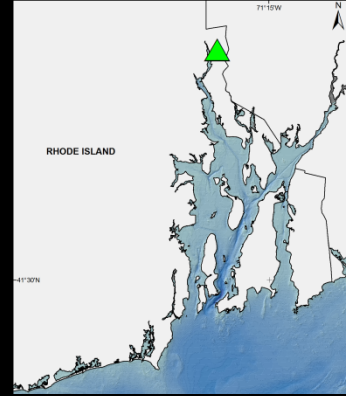
Blackstone River Delta: Mt. St. Mary's Cemetery



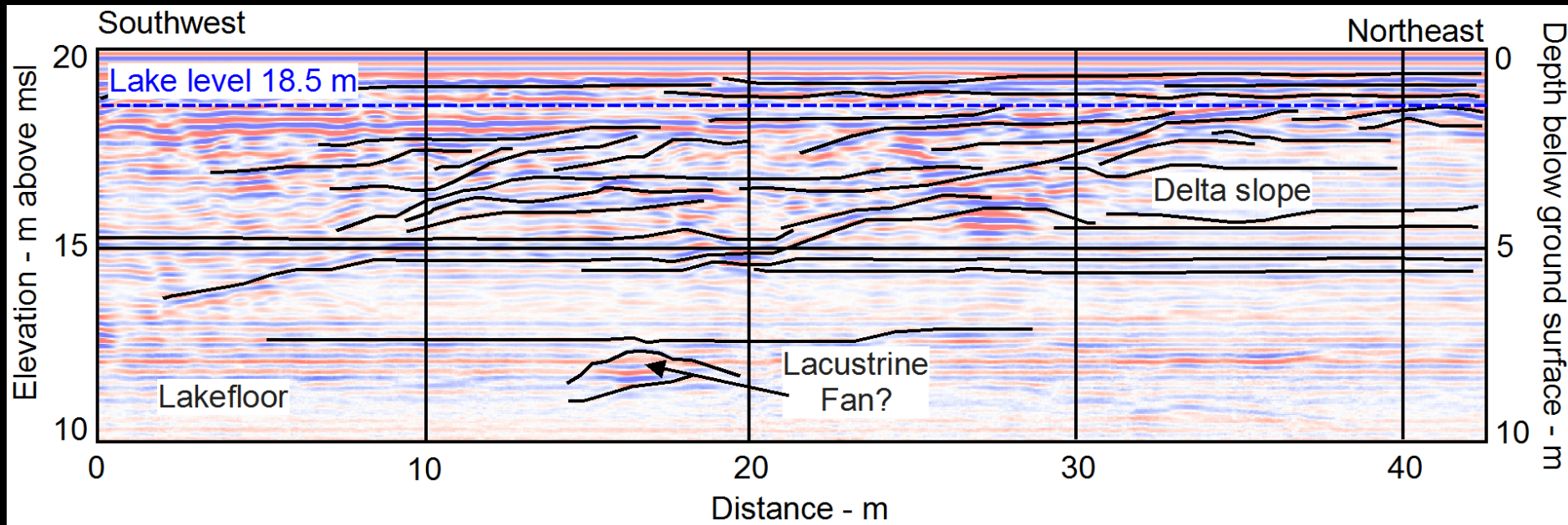
Blackstone River Delta: Mt. St. Mary's Cemetery



Jon C. Boothroyd

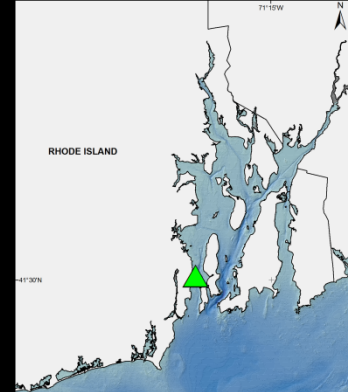


Blackstone River Delta – 18.5 m MSL

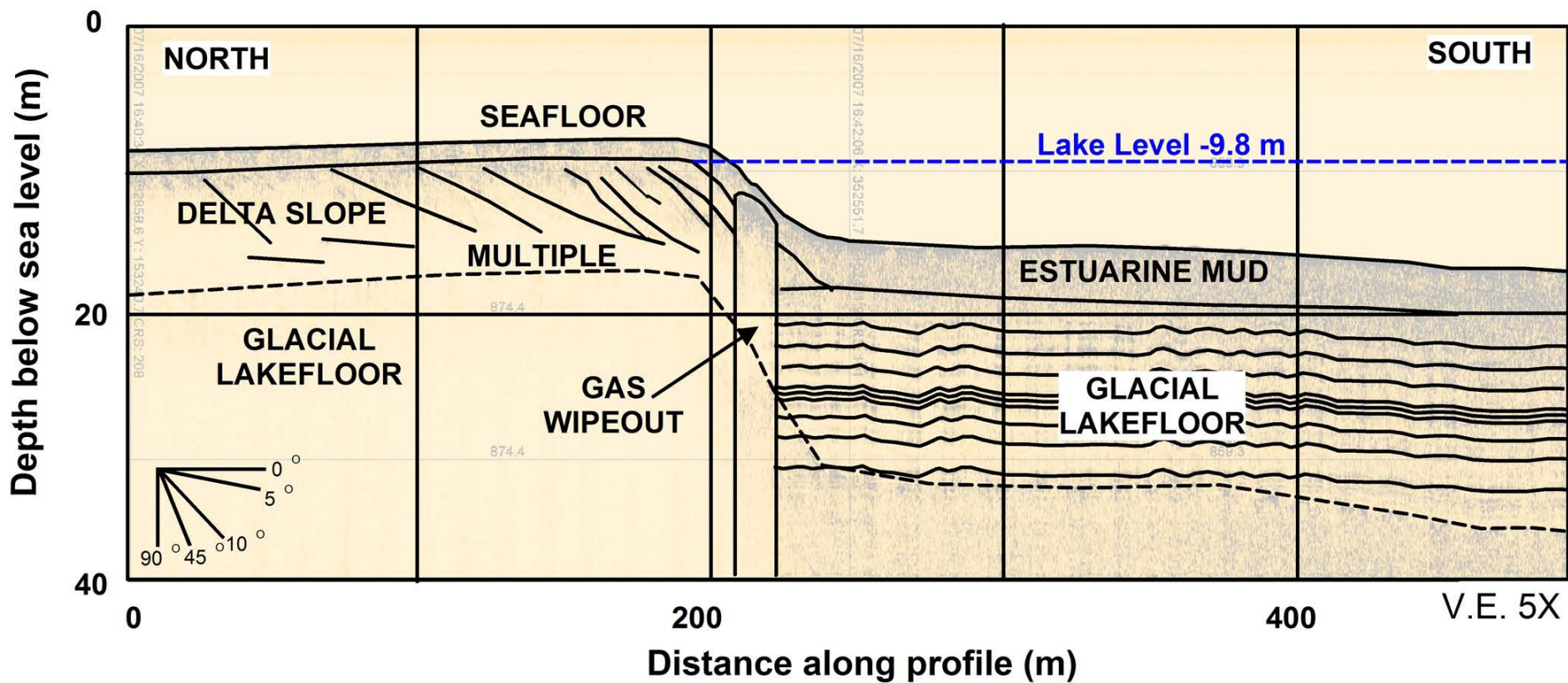


Collected with a 120 MHz GSSI Antenna

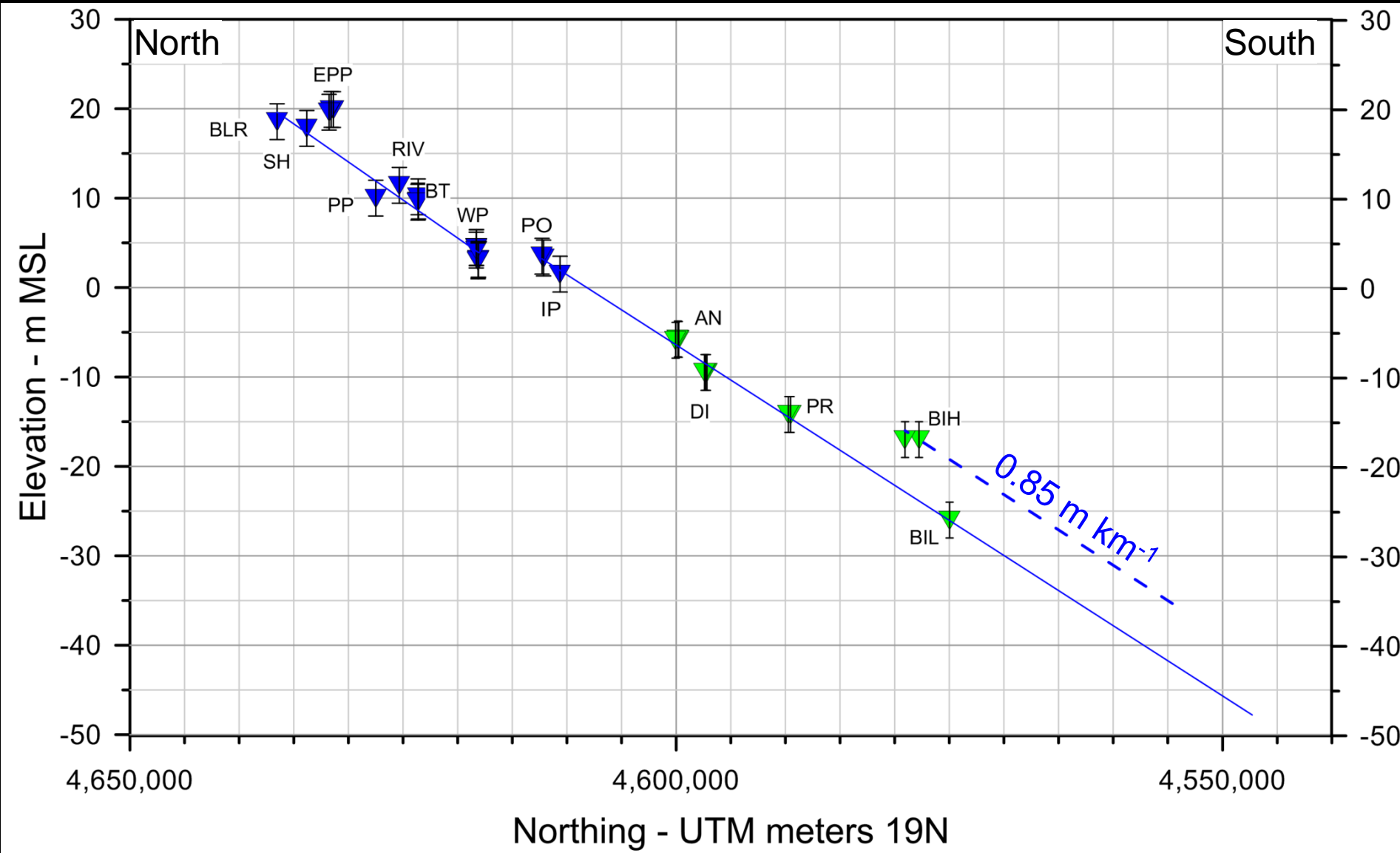
SEISMIC REFLECTION PROFILES



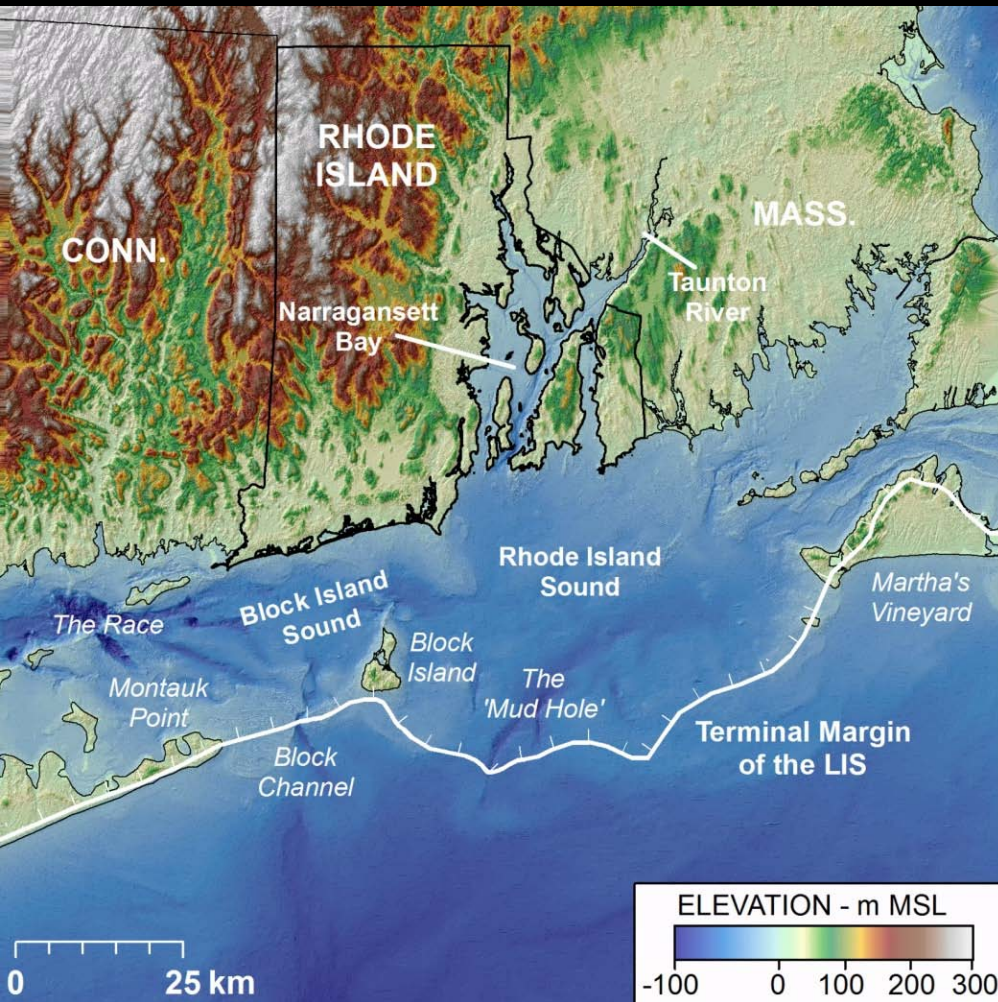
Dutch Island Delta 9.8 m below MSL



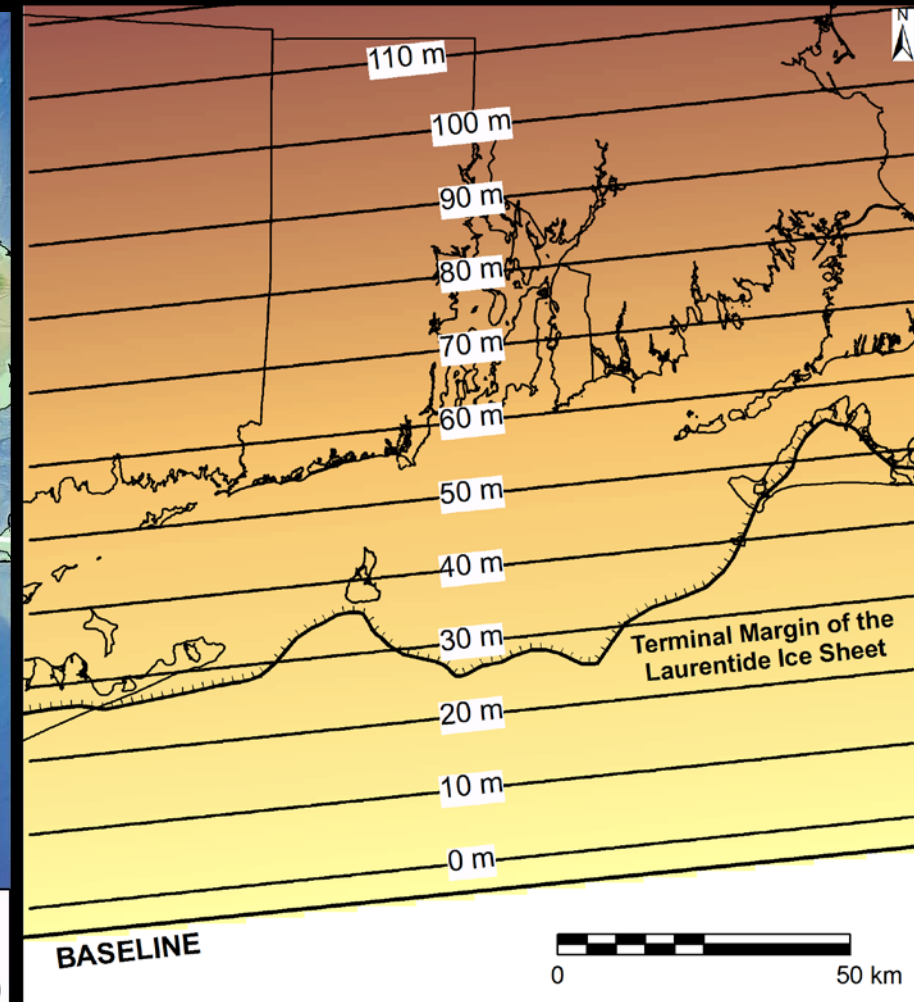
WATER-LEVELS OF GLACIAL LAKES BLOCK ISLAND RHODE ISLAND AND NARRAGANSETT



PRESENT TERRAIN MODEL

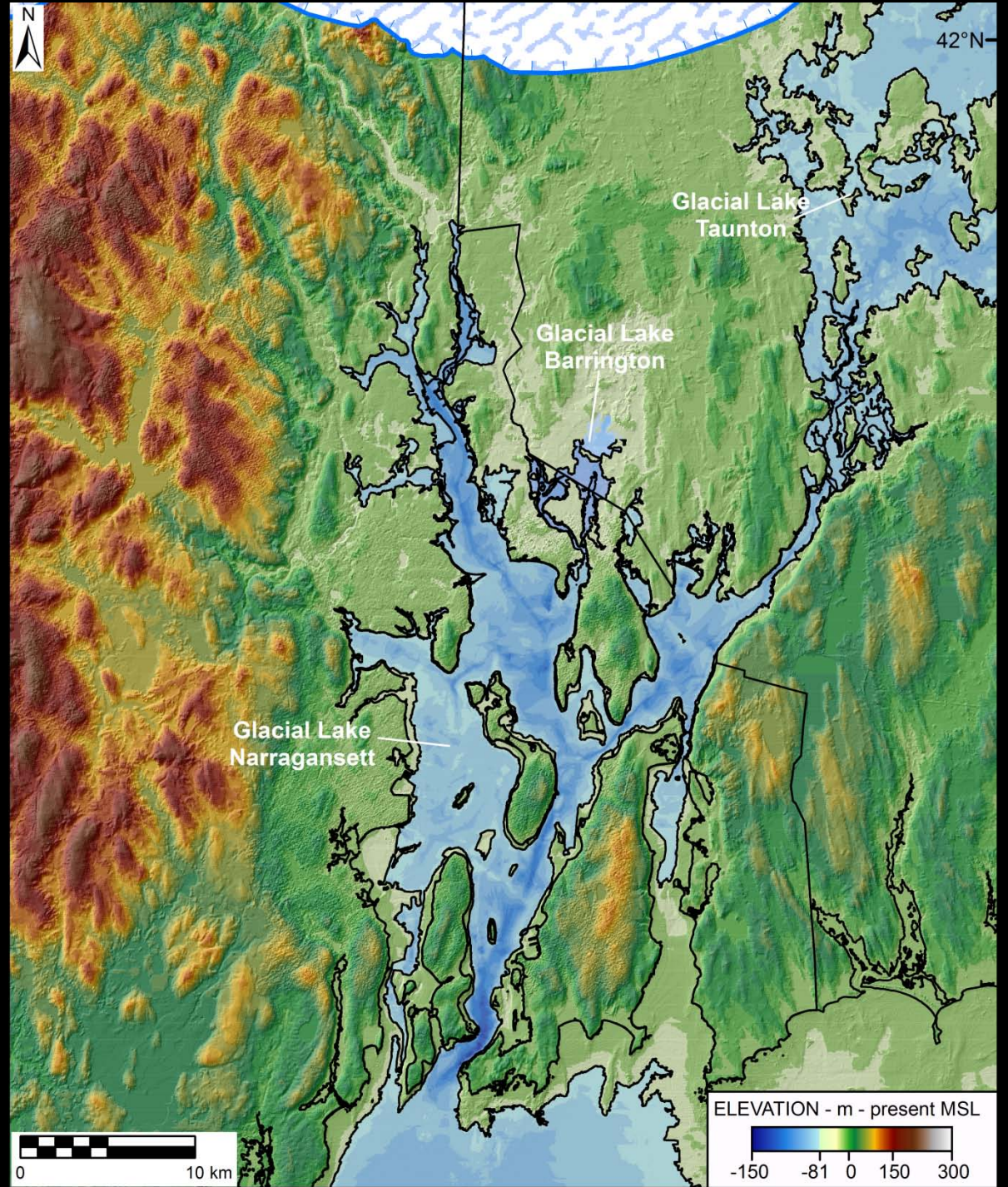


ISOBASE SURFACE



Oakley and Boothroyd 2012: In press, *Quaternary Research*

PROJECTED WATER LEVEL GLACIAL LAKE NARRAGANSETT



CONCLUSIONS

- Elevation of delta plain-delta slope can be determined using GPR and RTK-GPS
- Three water-levels best fit the present elevation of the deltas and reflect the regional trend of rebound
- Water-levels projected onto a pre-isostatic rebound terrain indicate Glacial Lake Narragansett extended through most of the basin

QUESTIONS?



ACKNOWLEDGEMENTS

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C. Damon: *URI Environmental Data Center*

