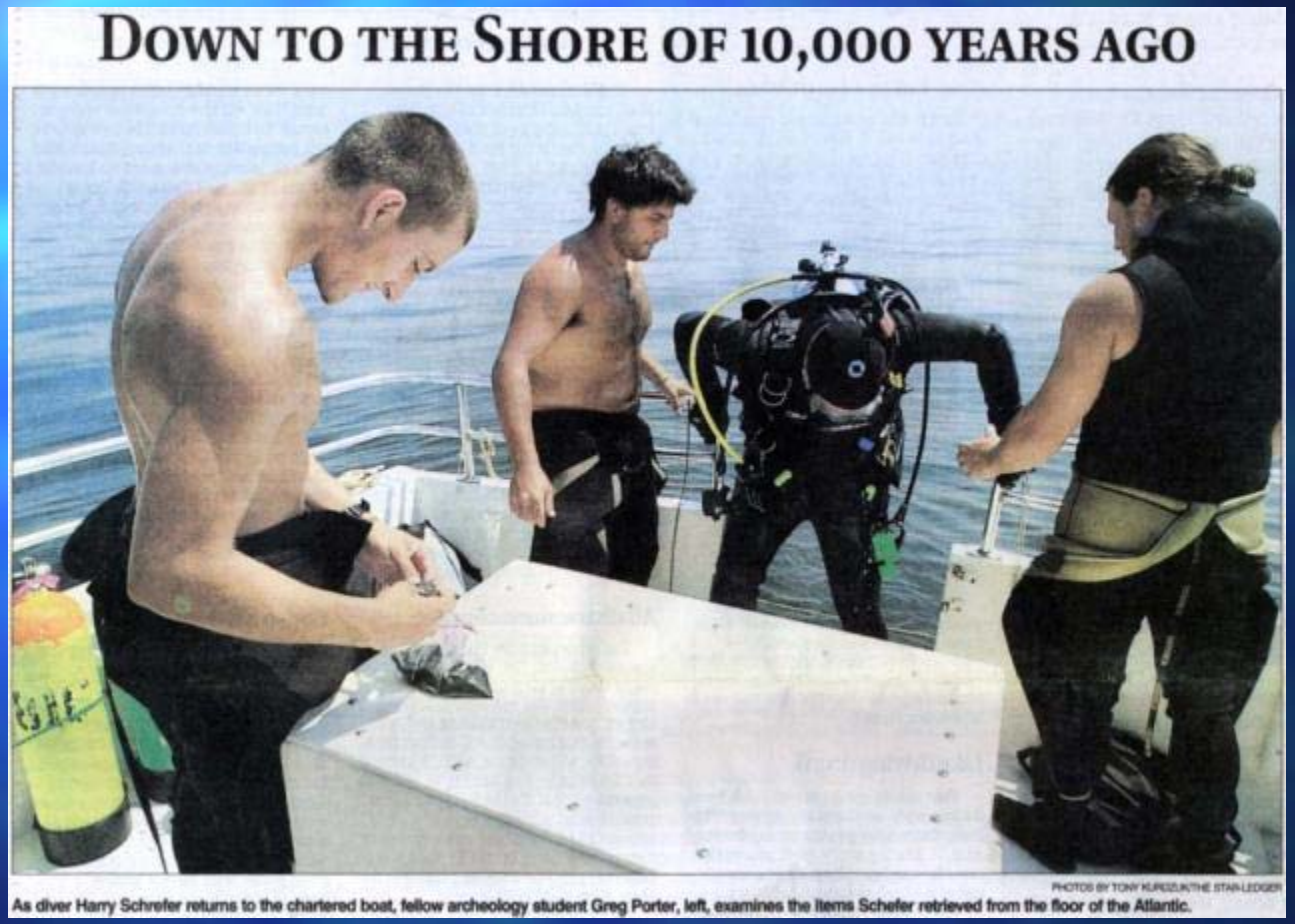
Paleolandforms and Prehistoric Site Potential on the Mid-Atlantic OCS



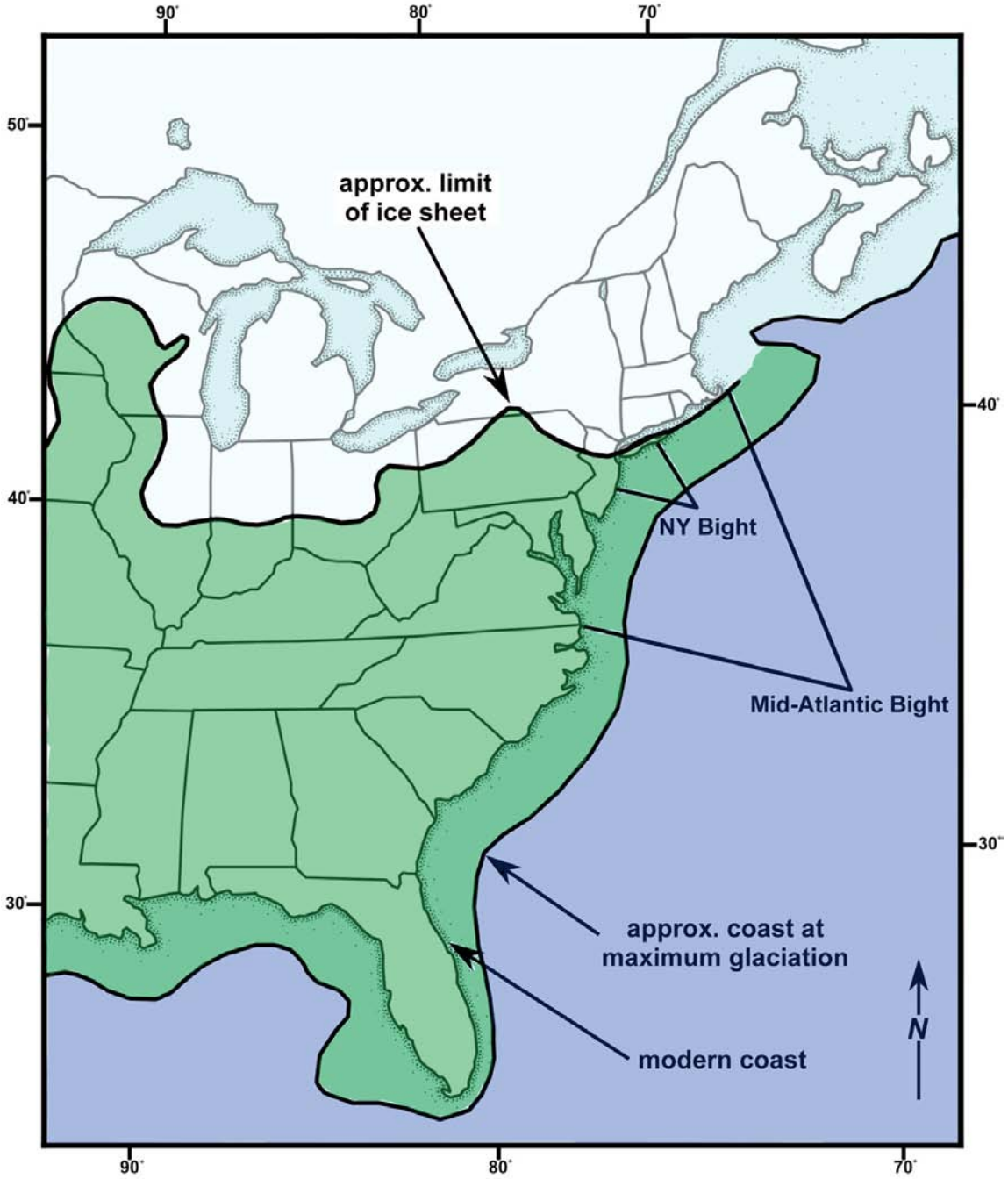
DOWN TO THE SHORE OF 10,000 YEARS AGO

PHOTOS BY TONY KURDZUK/THE STAR-LEDGER

As diver Harry Schrefer returns to the chartered boat, fellow archeology student Greg Porter, left, examines the items Schefer retrieved from the floor of the Atlantic.

Daria E. Merwin

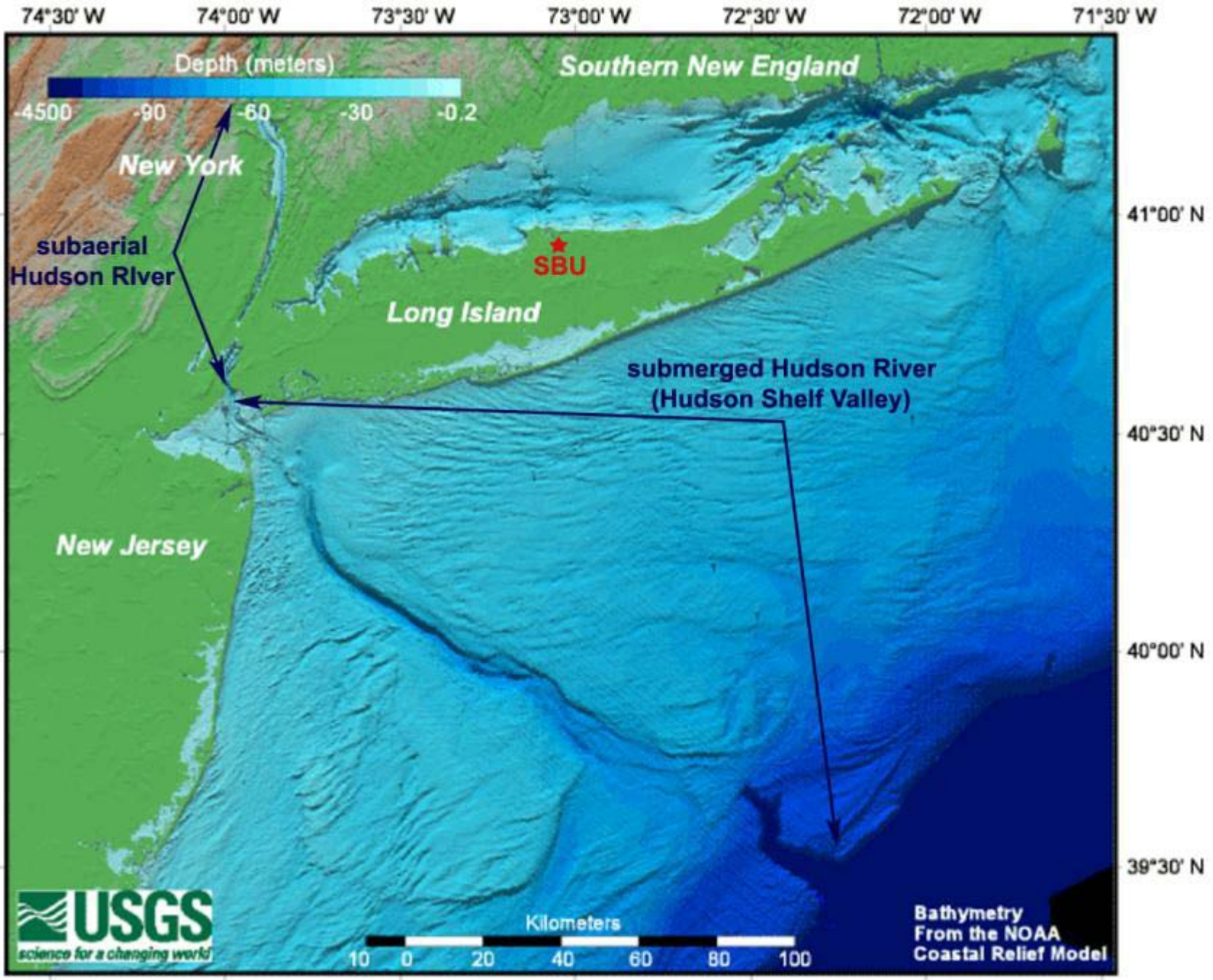
Department of Anthropology, Stony Brook University



bight: a bend in an open shoreline

New York Bight: between southern New Jersey and eastern Long Island

Mid-Atlantic Bight: between the Chesapeake Bay and Cape Cod


74°30' W
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73°30' W
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Depth (meters)
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-30
-0.2
Southern New England
New York
subaerial
Hudson RIver
SBU
Long Island
submerged Hudson River
(Hudson Shelf Valley)
New Jersey
41°00' N
40°30' N
40°00' N
39°30' N
USGS
science for a changing world
Kilometers
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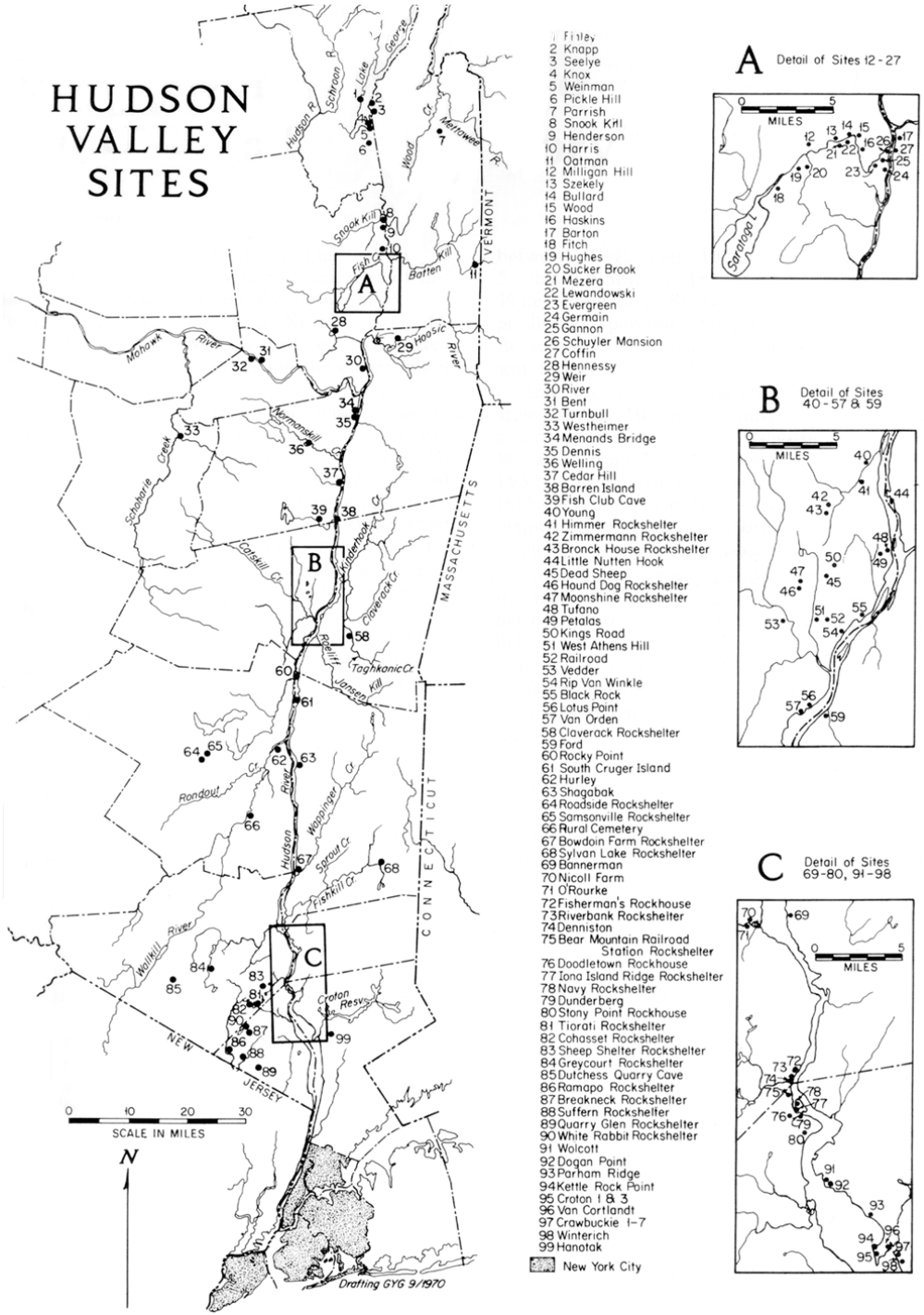
Bathymetry
From the NOAA
Coastal Relief Model



Terrestrial archaeological sites in the Hudson Valley (Funk, page xiii)

ARCHAEOLOGICAL POTENTIAL OF THE ATLANTIC CONTINENTAL SHELF*

K. O. Emery and R. L. Edwards

Abstract

Early man lived in eastern United States 11,000 years ago when most of the now-submerged continental shelf was exposed. The shelf almost certainly was ranged by nomadic hunters and possibly by marine fish- and mollusk-eaters. As the sea level rose at the end of the latest glacial epoch, the advancing water disrupted and submerged any habitation sites.

The oldest radiocarbon dates for kitchen middens of marine refuse along the present shore appear to be younger than the oldest dates for kitchen middens of non-marine content. Older marine middens may be deeply submerged far out on the continental shelf. Greatest success in future exploration for these sites is likely in areas of the shelf which have received little or no cover of postglacial sediment and where rivers formerly crossed the shelf.

IT HAS BEEN KNOWN for many years that broad expanses of the continental shelves were exposed during glacial stages of the Pleistocene Epoch. The relative lowering of sea level was sufficient to move the shoreline of eastern North America as far seaward as 150 km. The shelf was exposed long enough for spruce forests to develop on Georges Bank off the New England coast (Emery, Wigley, and Rubin, 1965); and one can safely assume that appropriate climax vegetation occurred elsewhere as well.

At present the sea level is comparatively stable and it has been so for the past 3,000 to 4,000 years. During the previous 8,000 years sea level rose rapidly (Fig. 1), although not so rapidly that a man in his lifetime would necessarily be aware of any rise. During this period, the shore, especially along the Atlantic Coast from southern New England to Florida, had the general appearance of the barrier beaches of the Carolinas and Virginia, and the lagoons, sounds, and tidal marshes immediately behind these barrier beaches probably were similar to those of today.

Animal species living at present also lived then and left their remains in abundance. For example, many bottom samples from between 20 and 90 meters contain one or more empty shells of the common edible oyster, *Crassostrea virginica* (Gmelin), which lives mostly in the tidal zone and to depths of only a few meters in the coastal lagoons and estuaries. Radiocarbon dates of six of the shells show that the animals that were housed in them lived as long ago as 10,850 years (Merrill, Emery, and Rubin 1965). These shells presumably indicate the presence of ancient oyster beds since there is no evidence that they have been carried out to sea or moved any distance by water currents.

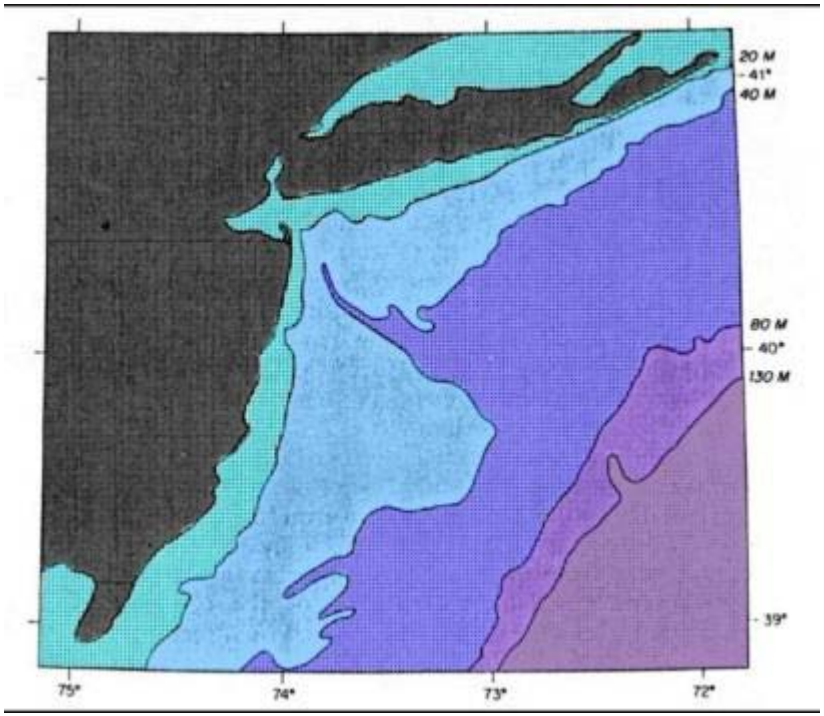
* Contribution No. 1661 of the Woods Hole Oceanographic Institution.

Marine Geology

During late 1962 a long-term geological and biological investigation of the continental margin off eastern United States was begun by the U.S. Geological Survey, the Woods Hole Oceanographic Institution, and the U.S. Bureau of Commercial Fisheries (Emery and Schlee 1963). The more than 1800 well-distributed samples that were collected during 1963 and 1964 yield considerable information about the bottom sediments. Most of the continental shelf is floored by detrital sands (Fig. 1) that are coarser grained than are those nearer shore in depths of less than about 20 meters. This distribution pattern indicates that modern detrital sands which escape coastal lagoons and estuaries remain in the nearshore zone. Only the finest-grained modern sediments, such as silts and clays, are carried farther seaward, and they mostly by-pass the entire continental shelf to be deposited in deep water. The coarse-grained sands on the shelf are iron stained and solution pitted, as though they had lain exposed at the sediment-water interface for a long time. This sand is believed to be a shore or nearshore deposit formed when sea level rose at the end of the latest glacial stage. Topographic evidence of former lagoons and estuaries exists in the form of submerged beach ridges and filled marine canyons and channels. The sand thus is properly termed relict or inherited from depositional conditions different from those of the present.

The ages of oyster shells and peat fit reasonably well the standard curve of sea level during the past 35,000 years that is based upon radiocarbon dates from many kinds of materials and at many places in the world (Shepard 1963: 1–10). This curve accords with other kinds of data (Broecker and Orr 1958; Frye and Willman 1961; Emiliani 1964) in showing that sea

Emery and Edwards 1966 *American Antiquity*



Emery, K.O. and R. Edwards. 1966, Archaeological potential of the Atlantic continental shelf. American Antiquity 31:733–737.

Excavation of shell midden deposit at the Stony Brook site (Terminal Archaic, ca. 3,000 B.P.)

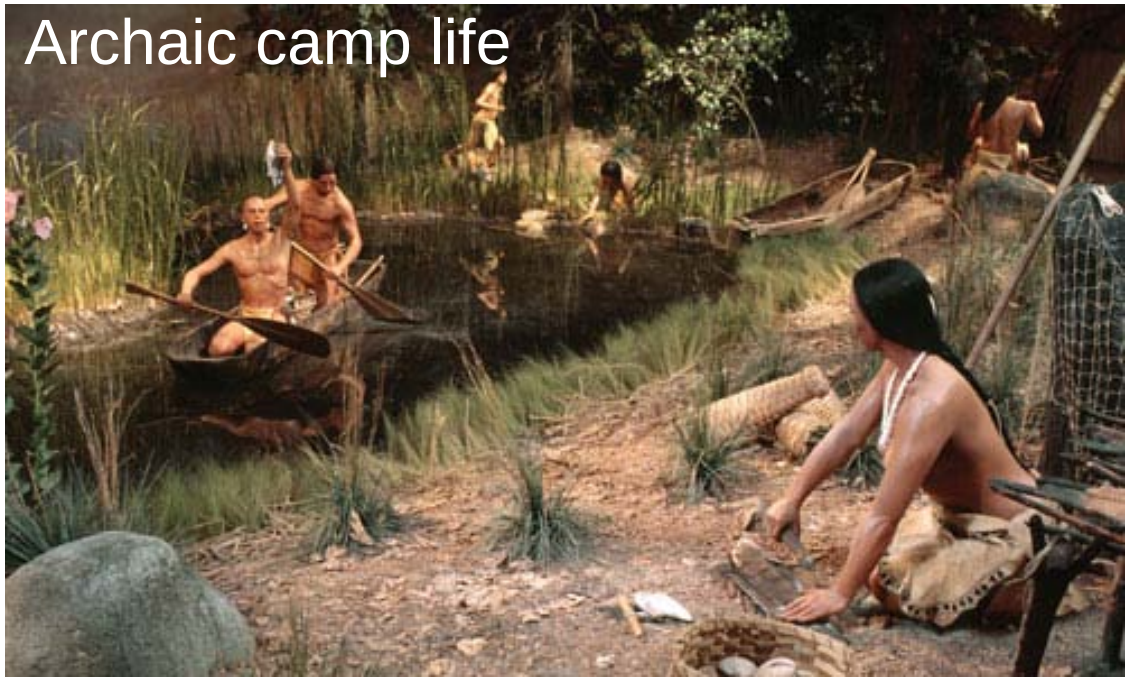
Early Native American subsistence and settlement patterns in the New York Bight likely had significant coastal components which have been obscured by rising sea levels.

Prehistoric Chronology for the Middle Atlantic Region

Period	*Dates*	*Comments*
Late Woodland	1,000 – 500 B.P. Late Holocene	modern sea level; triangular (Levanna, Madison) projectile points
Middle Woodland	2,000 – 1,000 B.P. Late Holocene	sea level very close to modern position; points include Jack's Reef, Selby Bay/Fox Creek
Early Woodland	2,700 – 2,000 B.P. Late Holocene	sea level close to modern position; points include Adena, Calvert, Rossville
Terminal Archaic	3,000 – 2,700 B.P. Late Holocene	sea level within 2-3 meters of modern position; small stemmed, Orient fishtail points
Late Archaic	6,000 – 3,000 B.P. Mid-Holocene	sea levels between 3 and 15 meters lower; variety of side-notched (Brewerton) and stemmed (Lamoka) points
Middle Archaic	8,000 – 6,000 B.P. Mid-Holocene	sea levels between 15 and 25 meters lower; stemmed (Morrow Mtn, Neville, Stanly) points
Early Archaic	10,000 – 8,000 B.P. Early Holocene	sea levels between 25 and 40 meters lower; corner-notched (Kirk, Palmer) and bifurcate base (LeCroy) points
Paleoindian	12,500 – 10,000 B.P. Late Pleistocene	sea levels more than 40 meters lower; fluted projectile points

Paleoindian hunting

Mashantucket Pequot Museum Exhibits



Woodland farming

Prehistoric Chronology for the Middle Atlantic Region

Period	*Dates*	*Comments*
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Middle Woodland	2,000 – 1,000 B.P. Late Holocene	sea level very close to modern position; points include Jack's Reef, Selby Bay/Fox Creek
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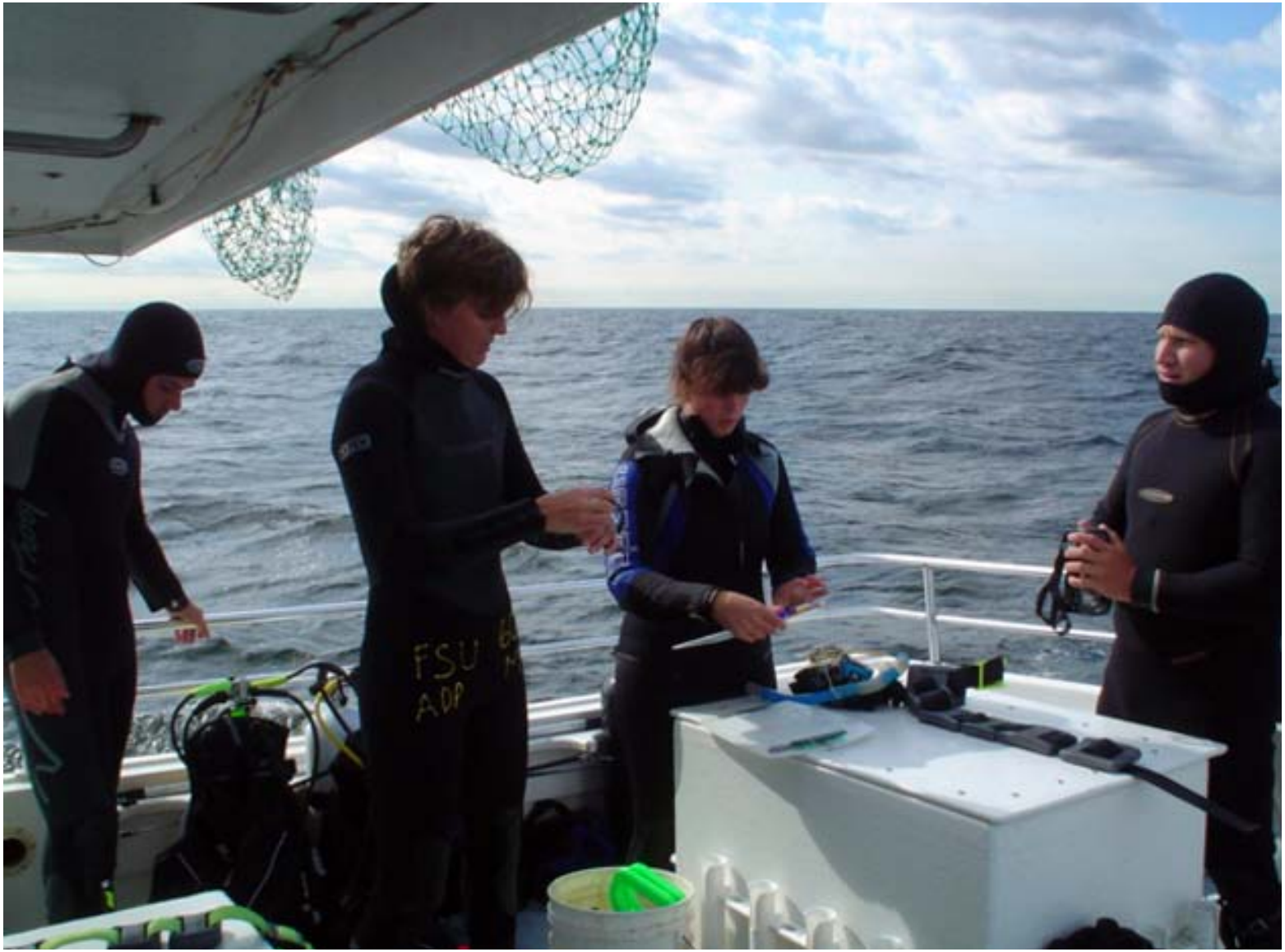
Middle Archaic	8,000 – 6,000 B.P. Mid-Holocene	sea levels between 15 and 25 meters lower; stemmed (Morrow Mtn, Neville, Stanly) points
Early Archaic	10,000 – 8,000 B.P. Early Holocene	sea levels between 25 and 40 meters lower; corner-notched (Kirk, Palmer) and bifurcate base (LeCroy) points
Paleoindian	12,500 – 10,000 B.P. Late Pleistocene	sea levels more than 40 meters lower; fluted projectile points

Where are the early sites?

some explanations

- missed because of lack of materials to date directly and/or ambiguous artifact styles
- site preservation issues (eroded, deeply buried, or inundated)
- sites exist, but not a research priority and/or we're not searching in the right places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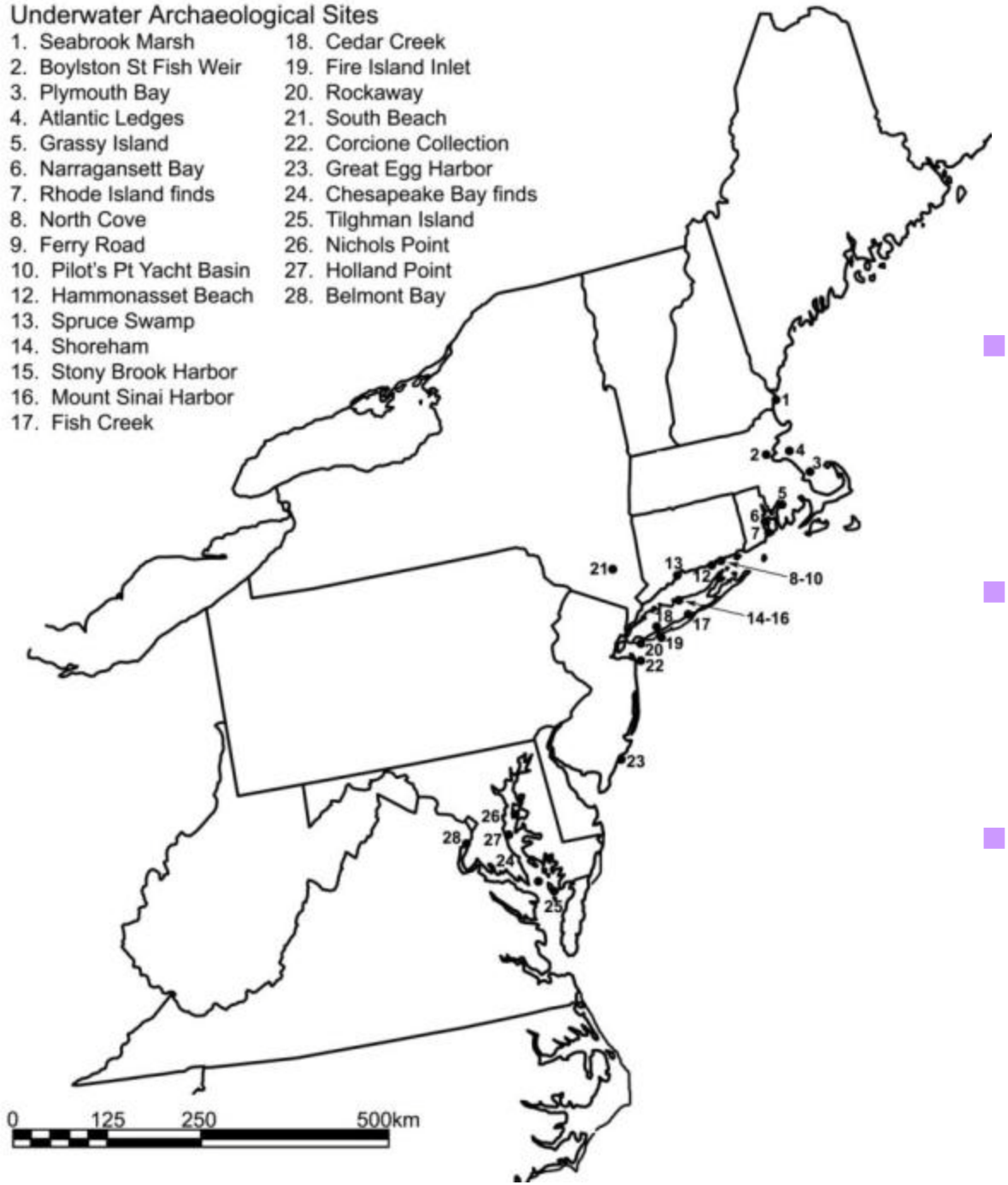
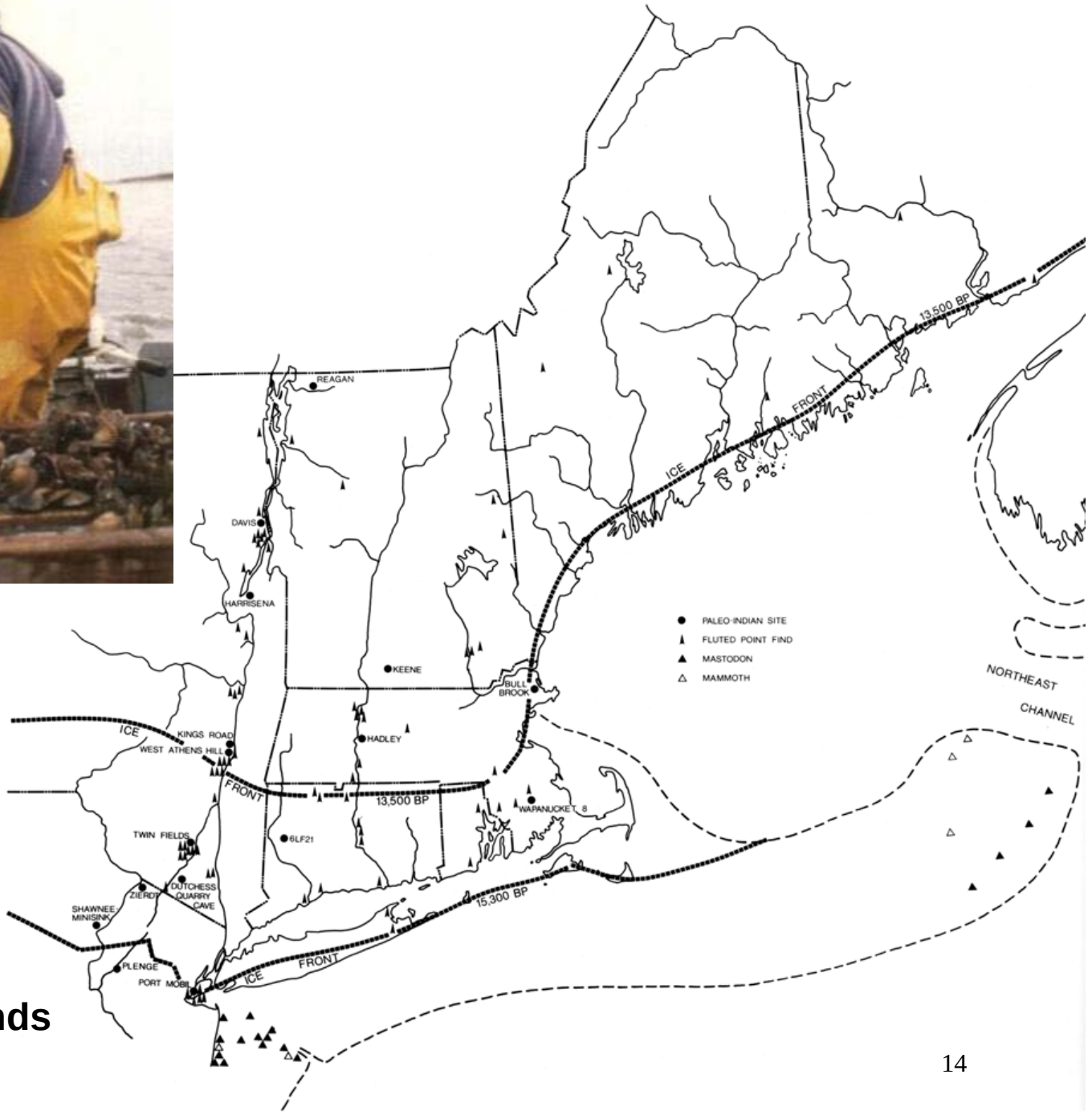


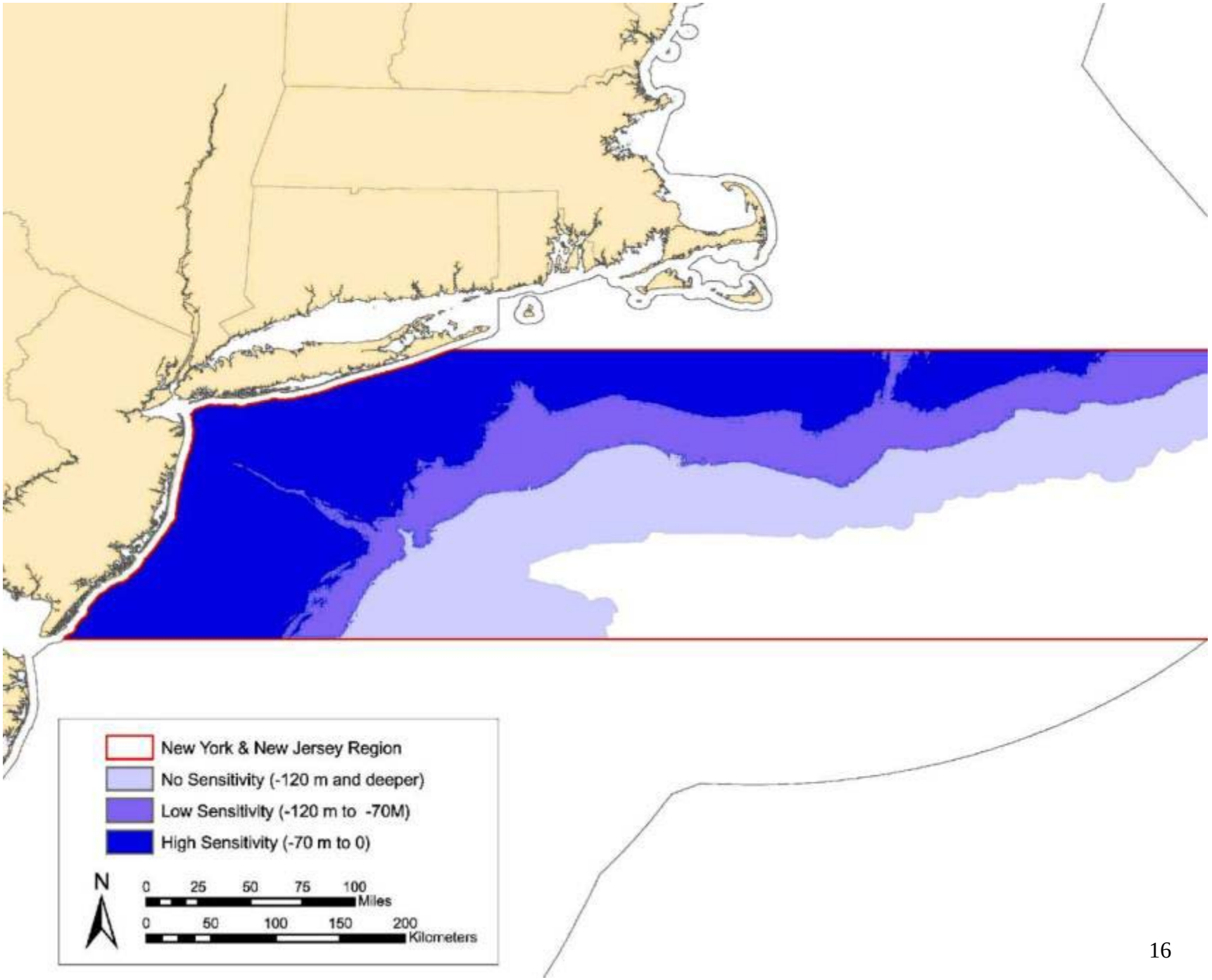
Known Underwater Archaeological Sites

- found in water from present mean sea level to 60 meters deep (most are intertidal or nearshore)
- mostly Archaic period, but all eras (Paleoindian, Archaic, and Woodland) represented
- range from isolated fluted projectile point to large multicomponent deposits



Map of megafauna finds from Snow, p. 104

Projectile point found on reconnaissance dive, submerged karst river valley in the northern Gulf of Mexico


New York & New Jersey Region
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Low Sensitivity (-120 m to -70M)
High Sensitivity (-70 m to 0)
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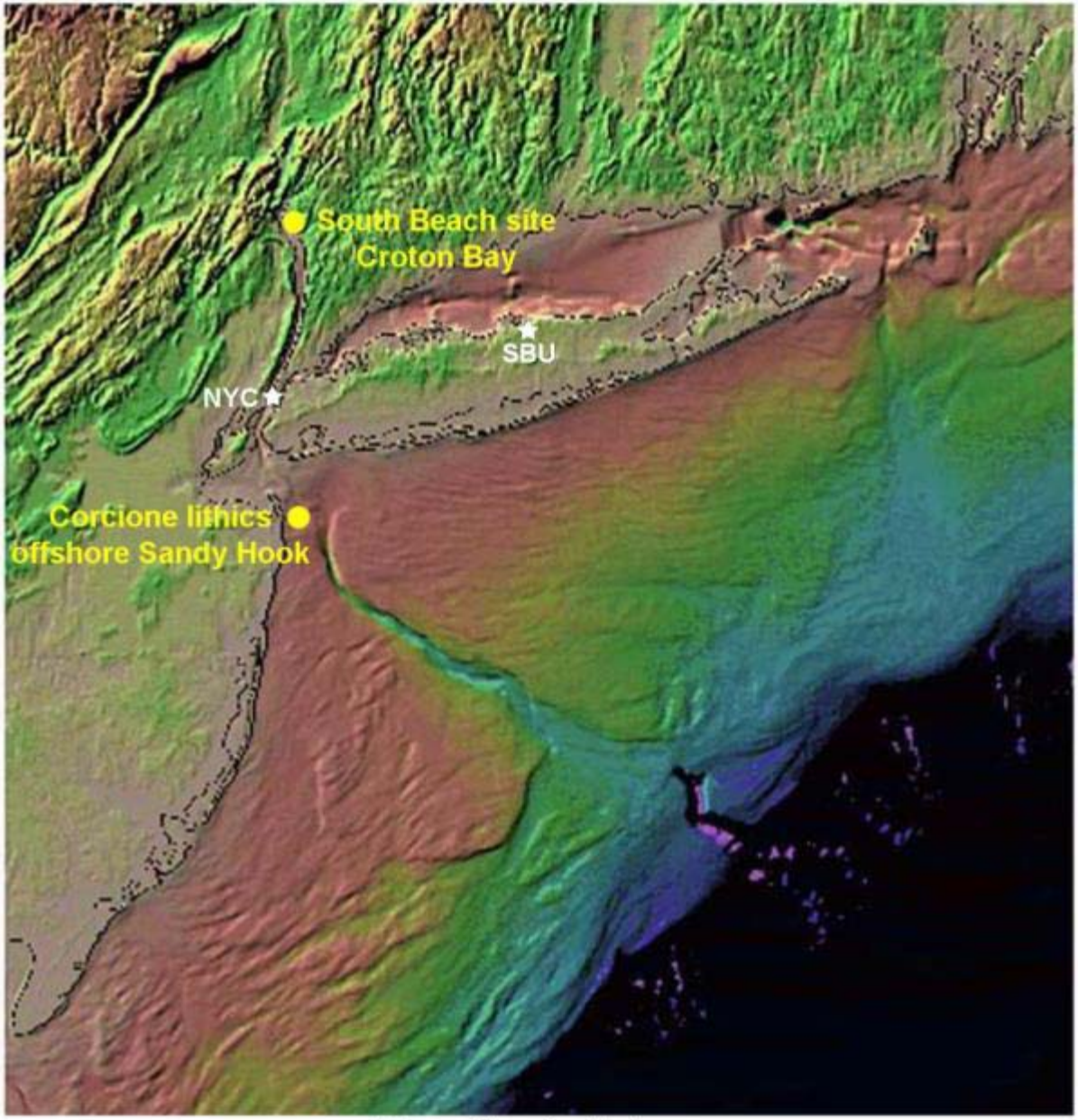
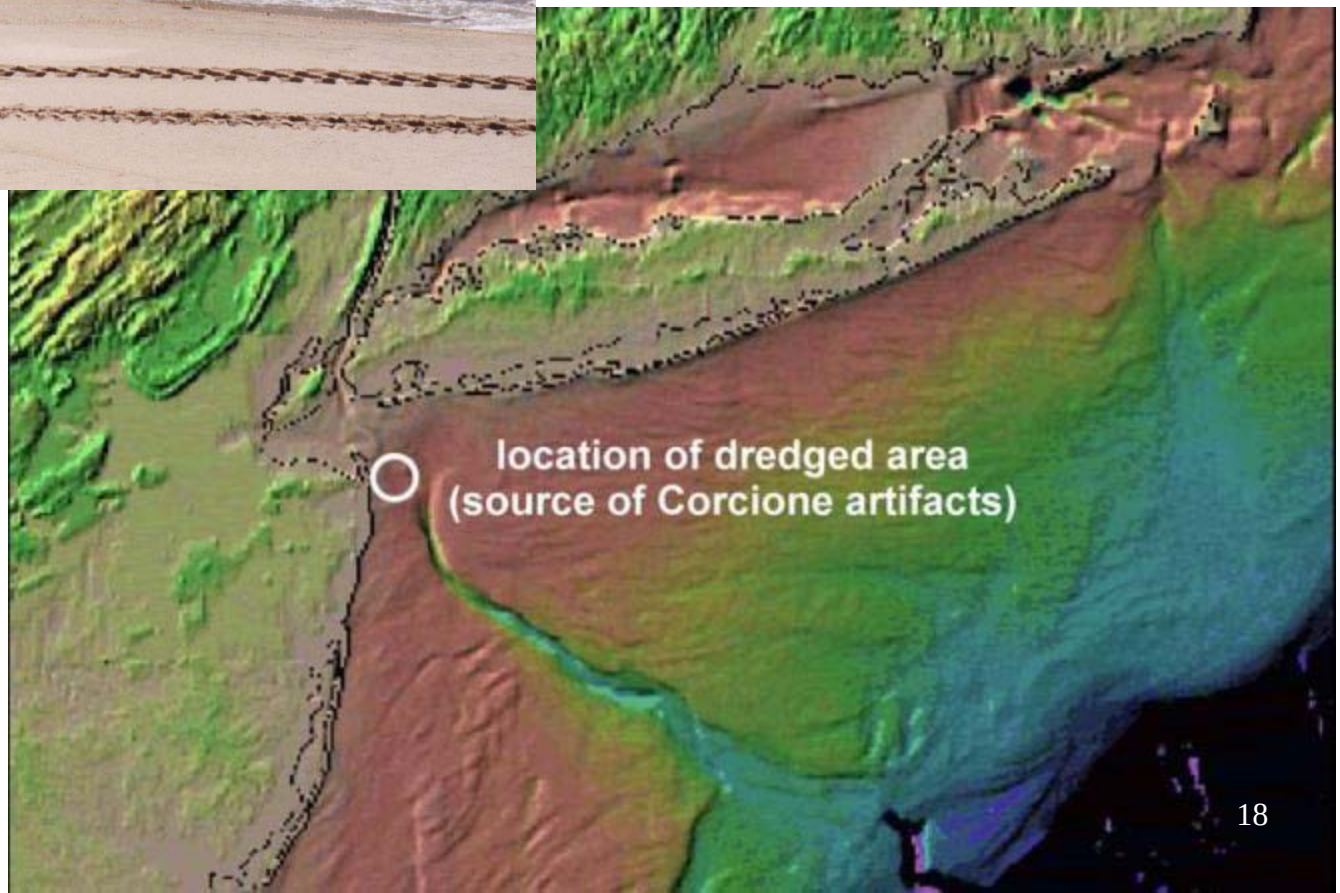


Digital elevation model of the New York Bight showing location of submerged prehistoric deposits adjacent to the Hudson River

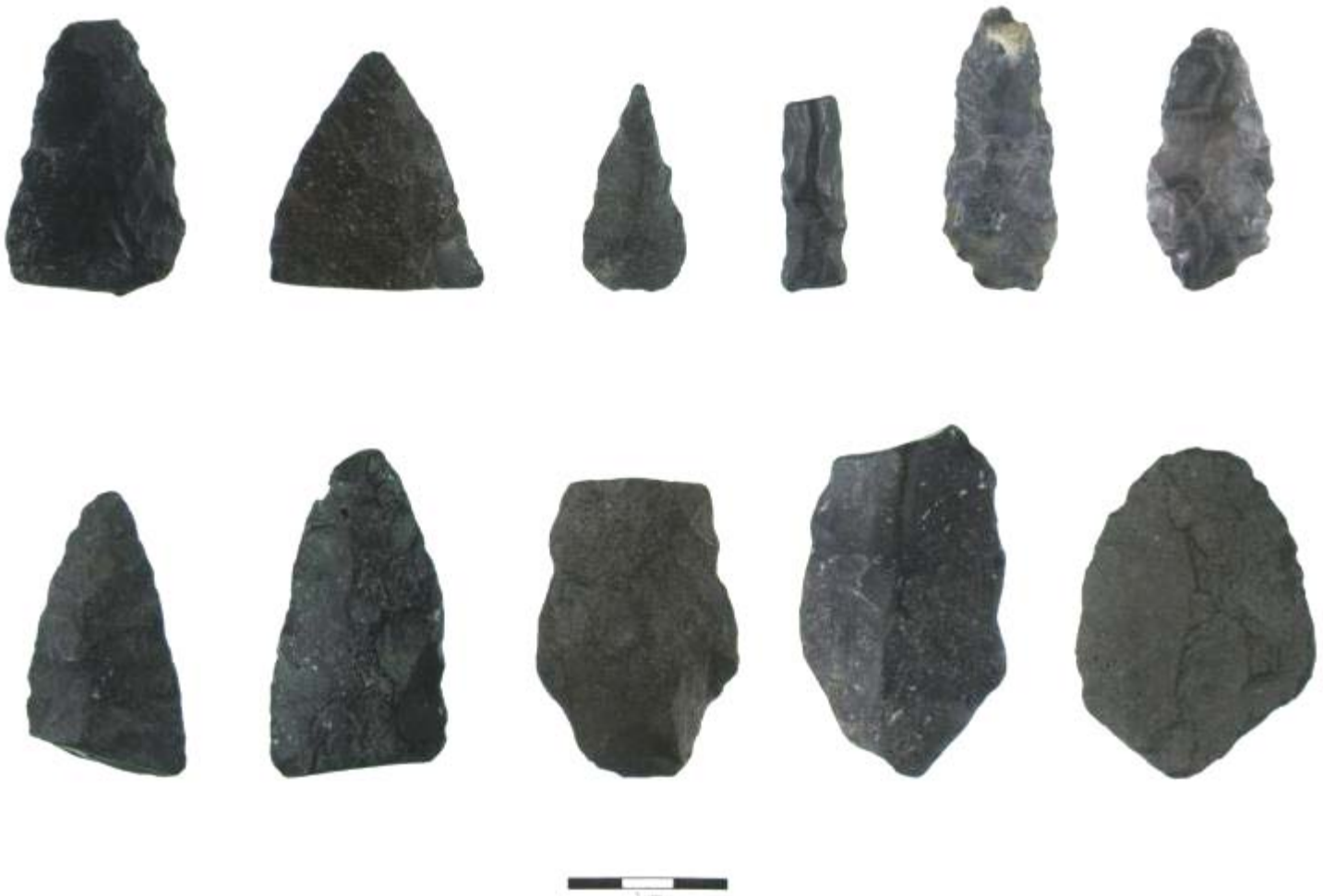
(image from http://oceanexplorer.noaa.gov/explorations/02hudson)


location of dredged area
(source of Corcione artifacts)

Thanks Mrs. C.!

Corcione collection projectile points, including two Early Holocene bifurcate base points (upper left)

Unmodified flakes from the Corcione collection



Sample of bifaces from the Corcione collection

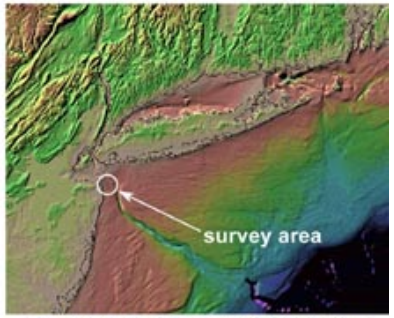
FIELD SCHOOL IN UNDERWATER ARCHAEOLOGY

July 14 - August 22, 2003

10,000 Years Beneath New York Harbor

The Department of Anthropology at SUNY Stony Brook is pleased to announce its field school in underwater archaeology. The six-week summer 2003 program will give students the opportunity to work on underwater sites in the New York metro area. Field operations are made possible by the generous cooperation of the National Park Service, Gateway National Recreation Area (NRA), and will be based at Sandy Hook, New Jersey.

Field work will focus on the search for, and investigation of, submerged prehistoric Native American sites. Recent offshore dredging has revealed the presence of prehistoric deposits in the region. Our project is the first to systematically survey this portion of the continental shelf for prehistoric archaeological sites. In addition, field school students will gain experience working with shipwrecks in the New York metro area.



The search for submerged prehistoric sites will take place between Sandy Hook and the drowned portion of the Hudson River.

A sample of the more than 200 prehistoric Native American stone tools found during offshore dredging in New York Harbor east of Sandy Hook.

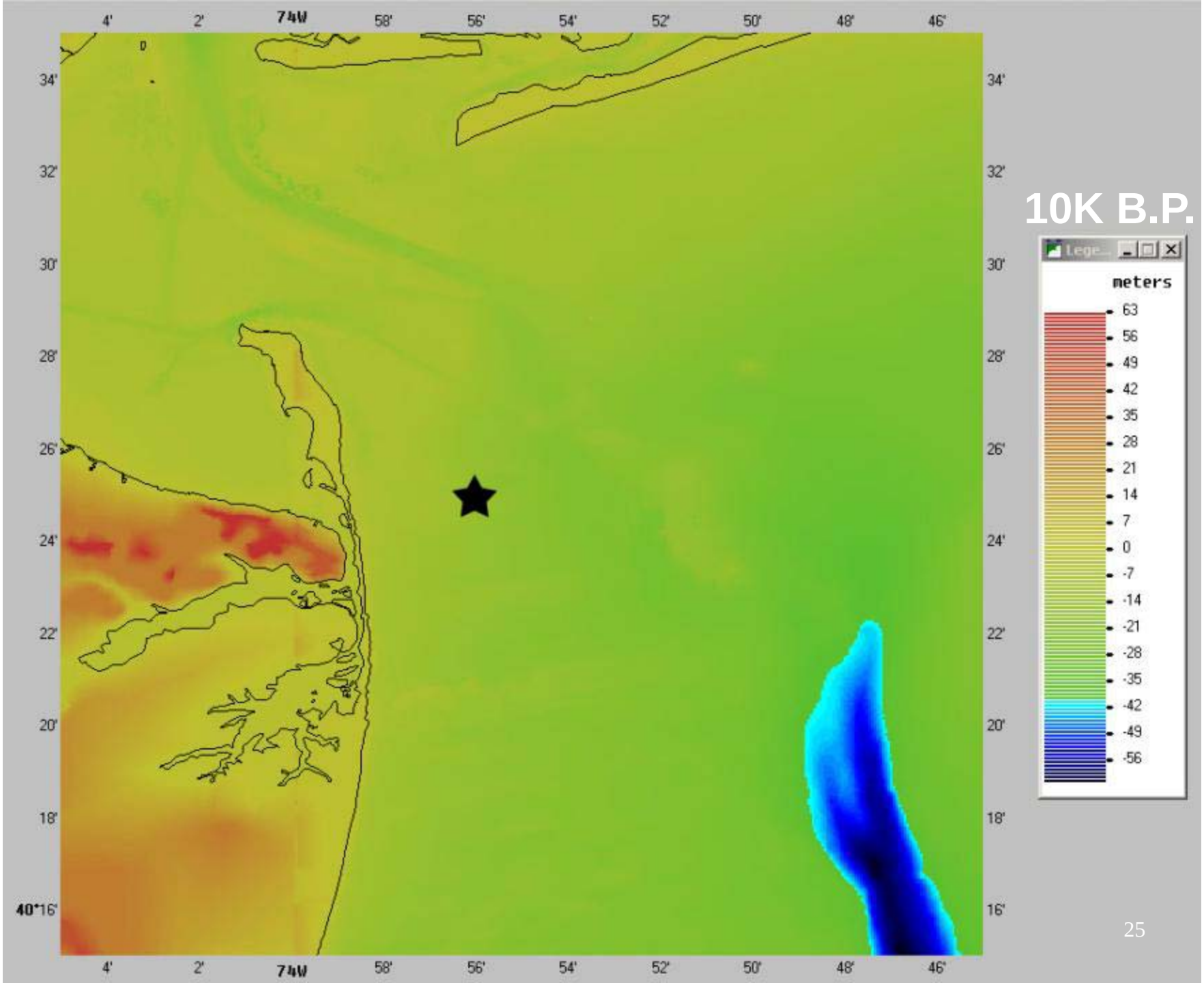
Participants will be trained in archaeological survey and excavation techniques, including remote sensing, underwater excavation and artifact recovery methods, mapping, and site interpretation. Daily field work will be supplemented by evening lectures and lab activites.

The field school is open to advanced undergraduate students, and credit is available through SUNY Stony Brook. Rates for 6 credits tuition and fees are $924.60 (NY State students) and $2153.60 (out-of-state), plus a course fee of $800 for board and other expenses. Housing will be provided at Sandy Hook. Students must be certified scuba divers, and supply their own diving equipment (weights and tanks will be provided).

Applications Due May 16, 2003

For more information and an application form,
please contact Daria Merwin:
phone 631-632-7618, fax 631-632-9165
email Daria.Merwin@stonybrook.edu
web http://blackboard.sunysb.edu
(login as guest, search courses for ANT 394)

Black chert flakes from offshore survey block 5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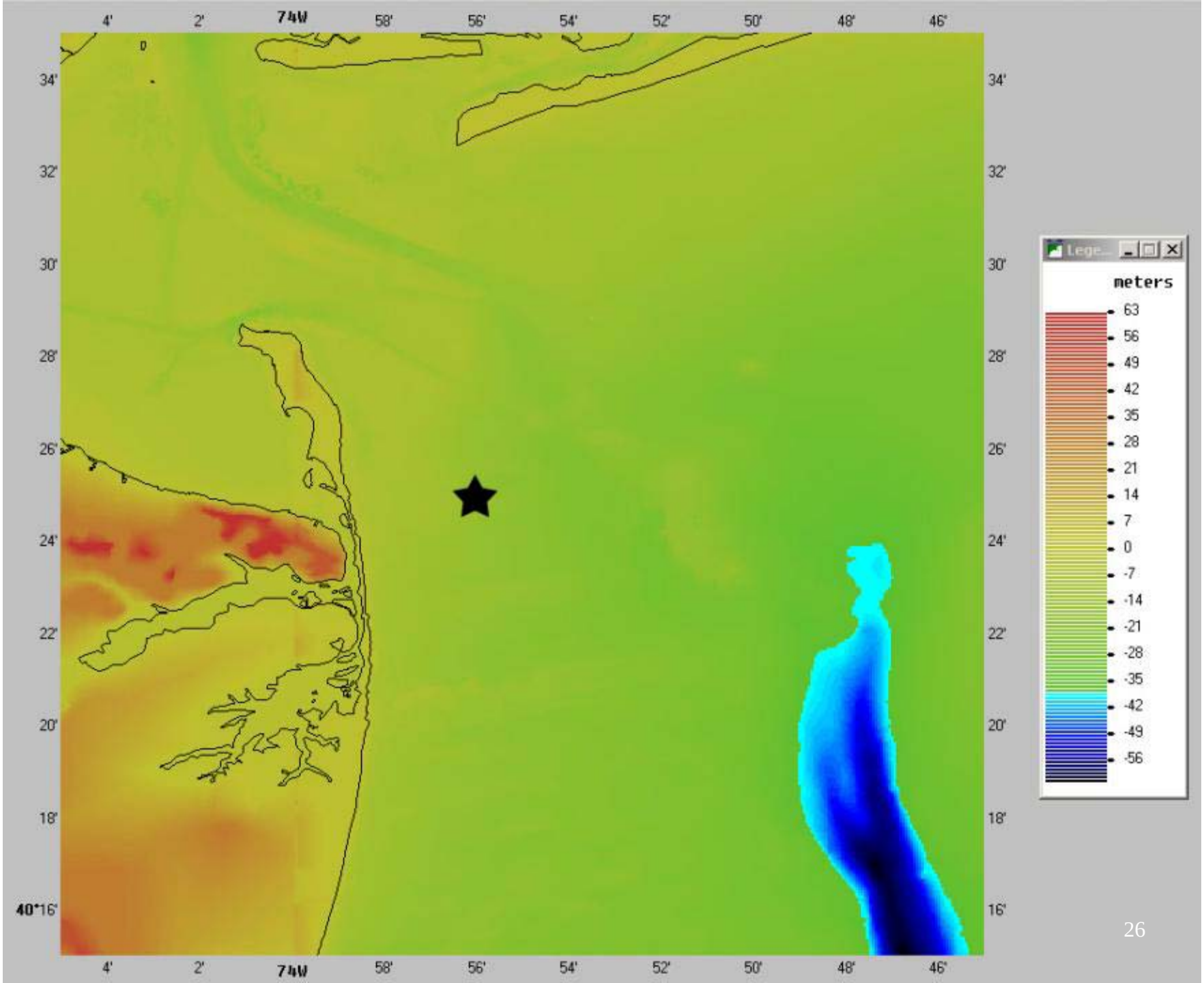
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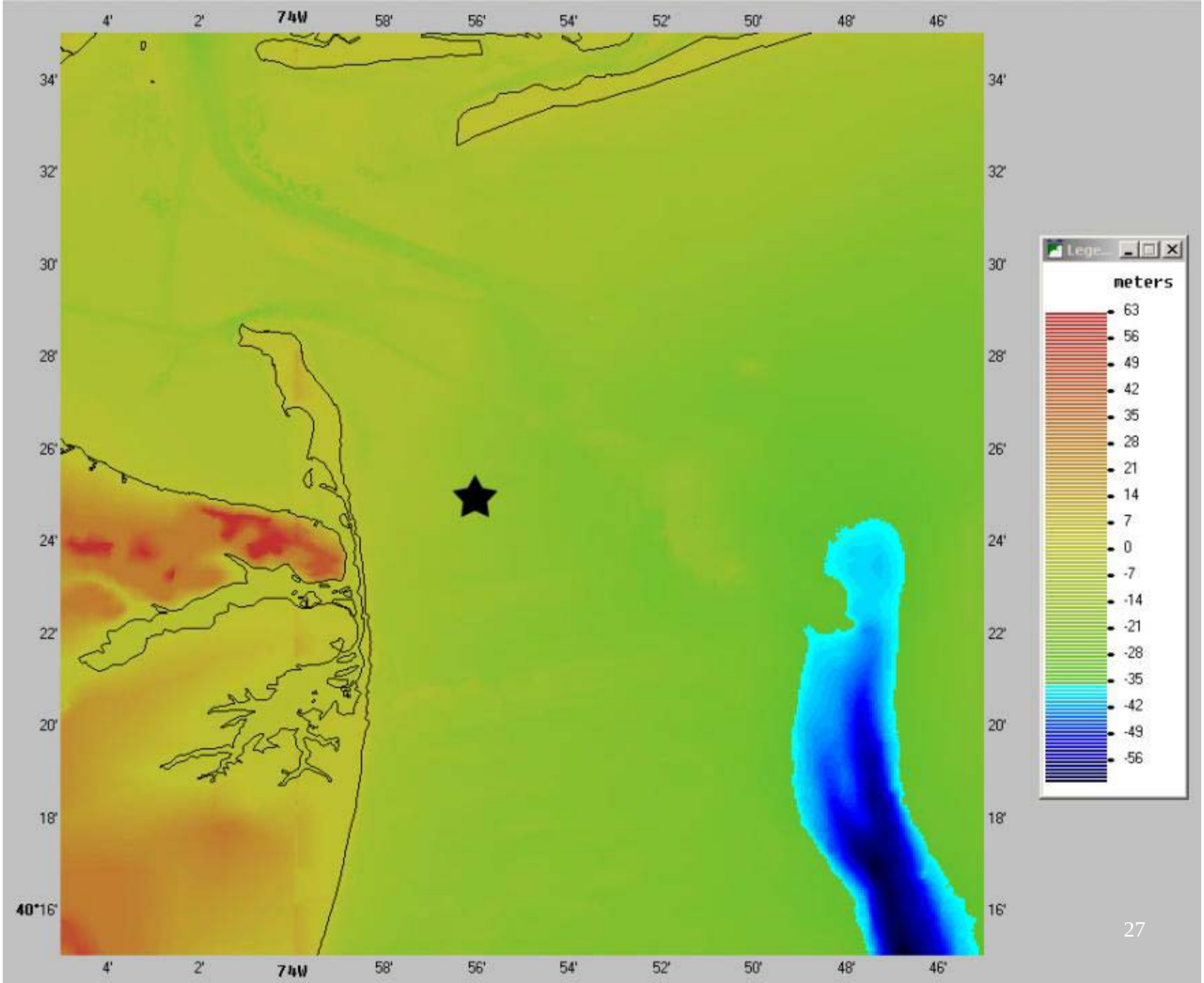
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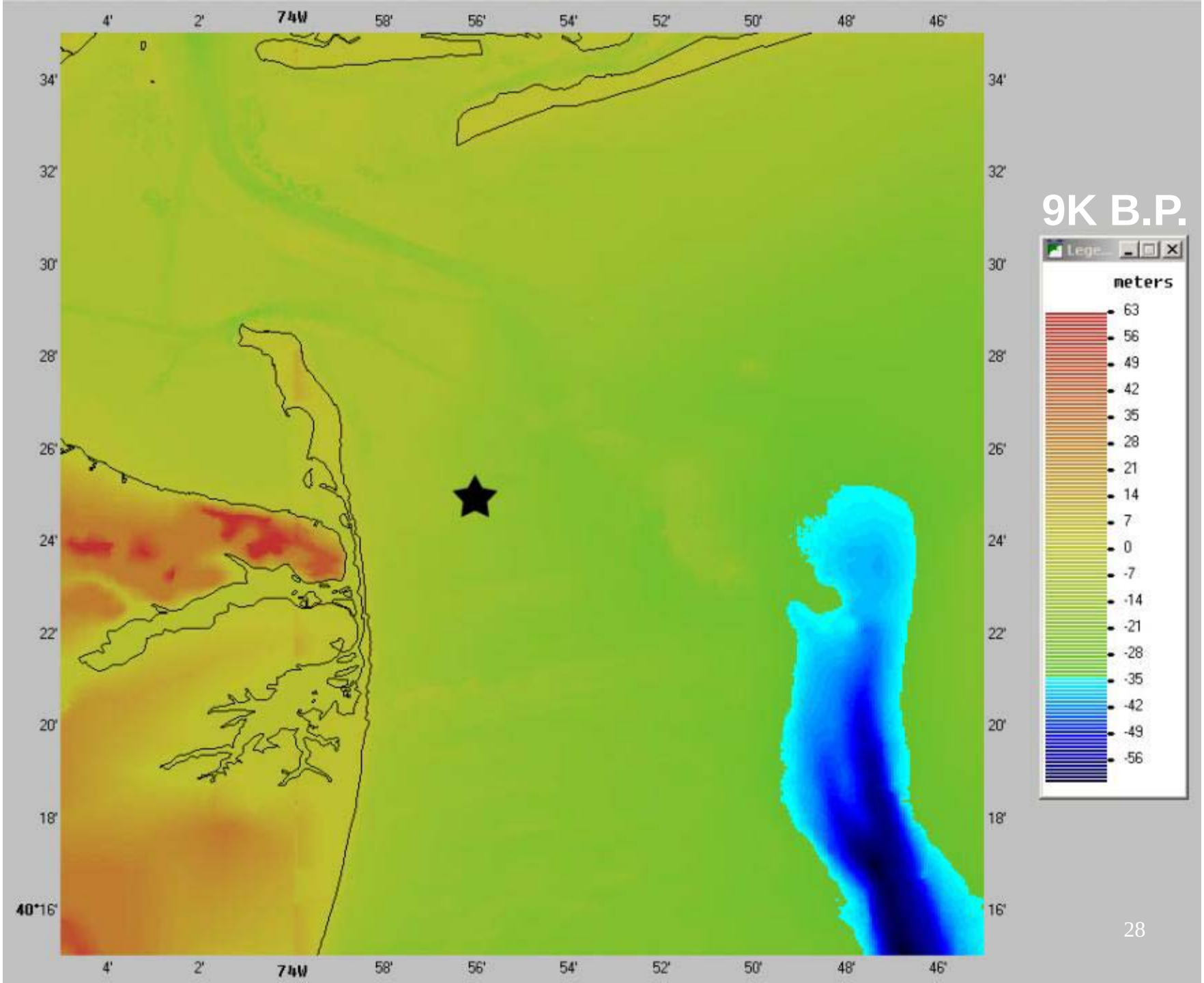
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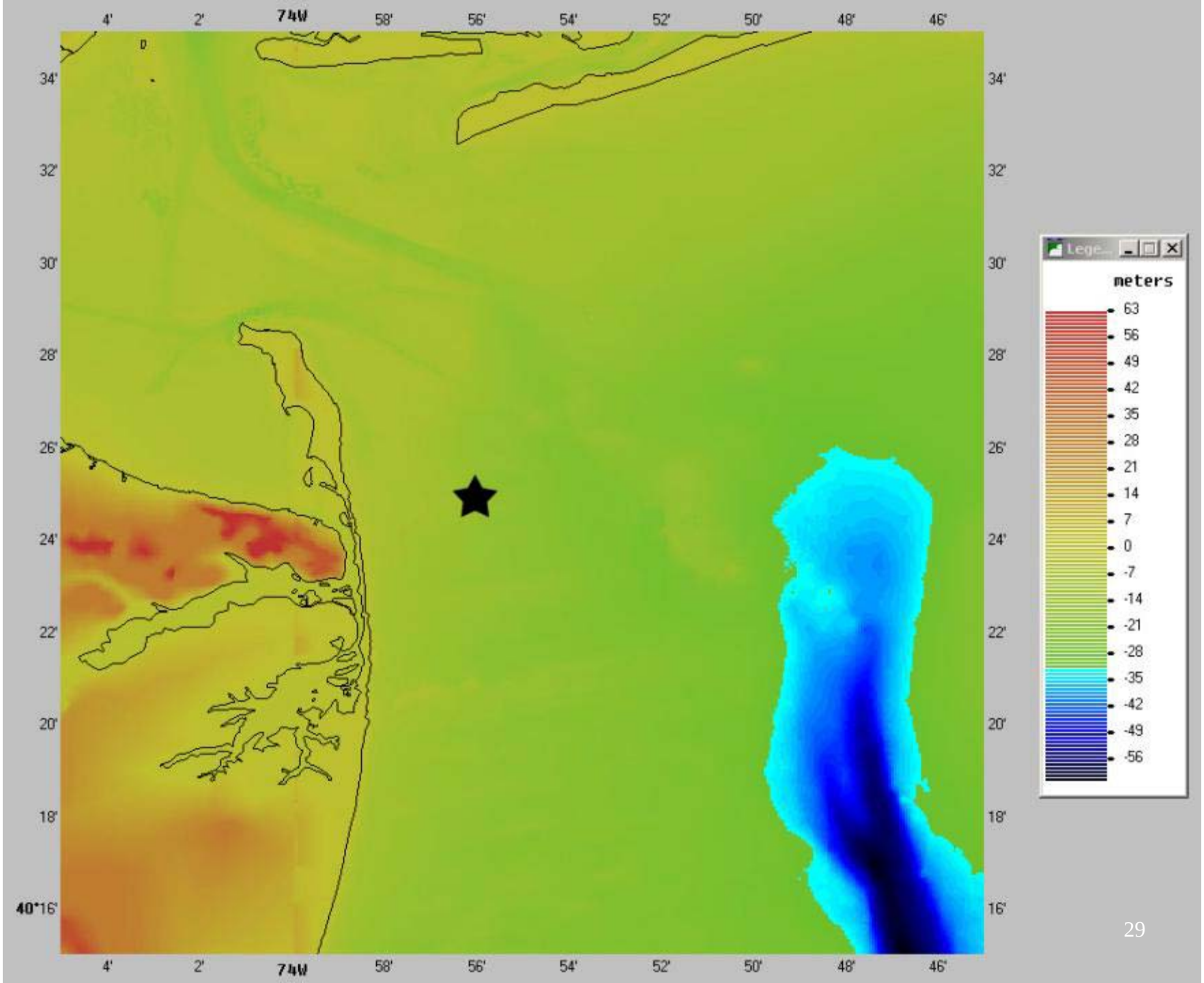
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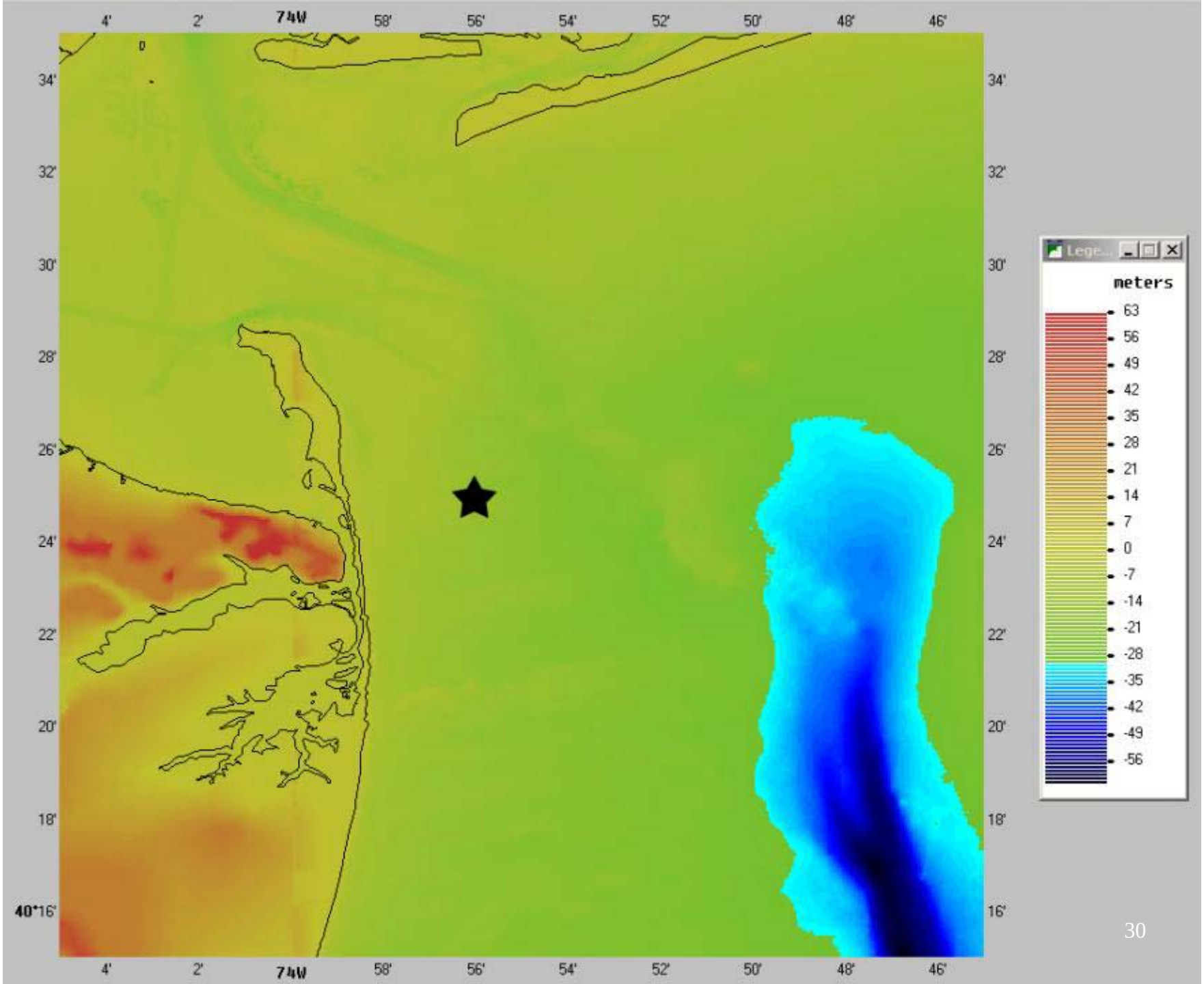
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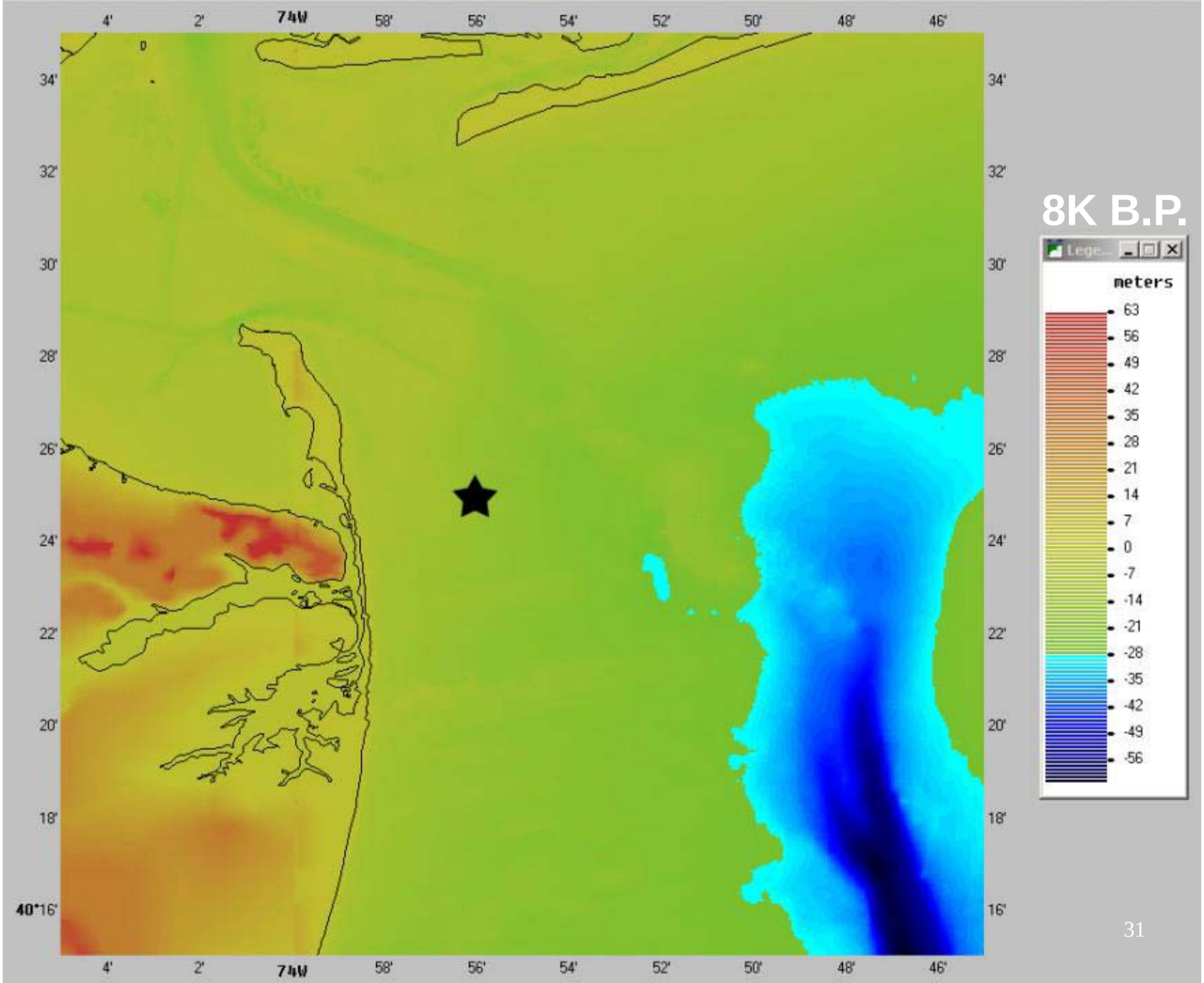
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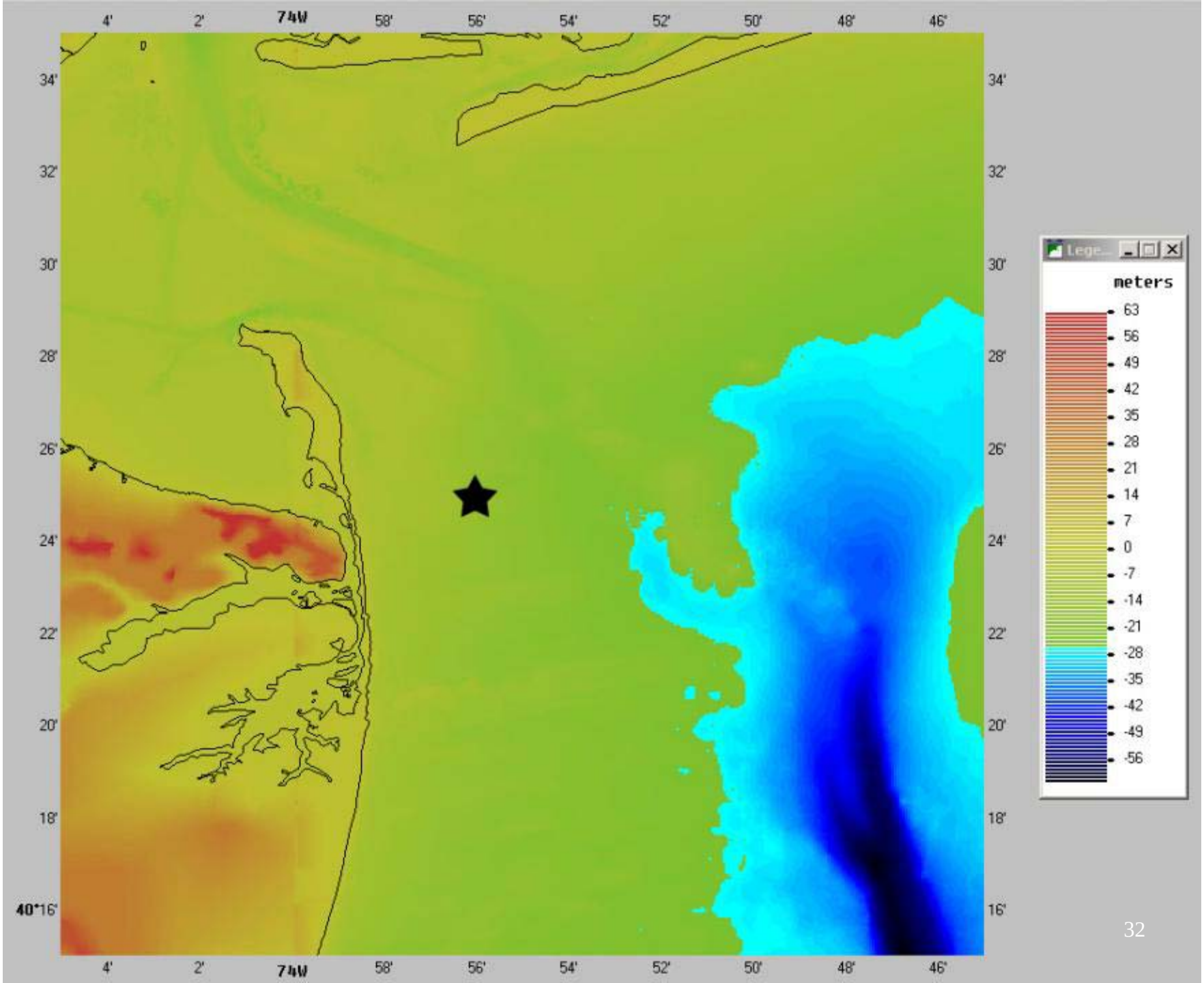
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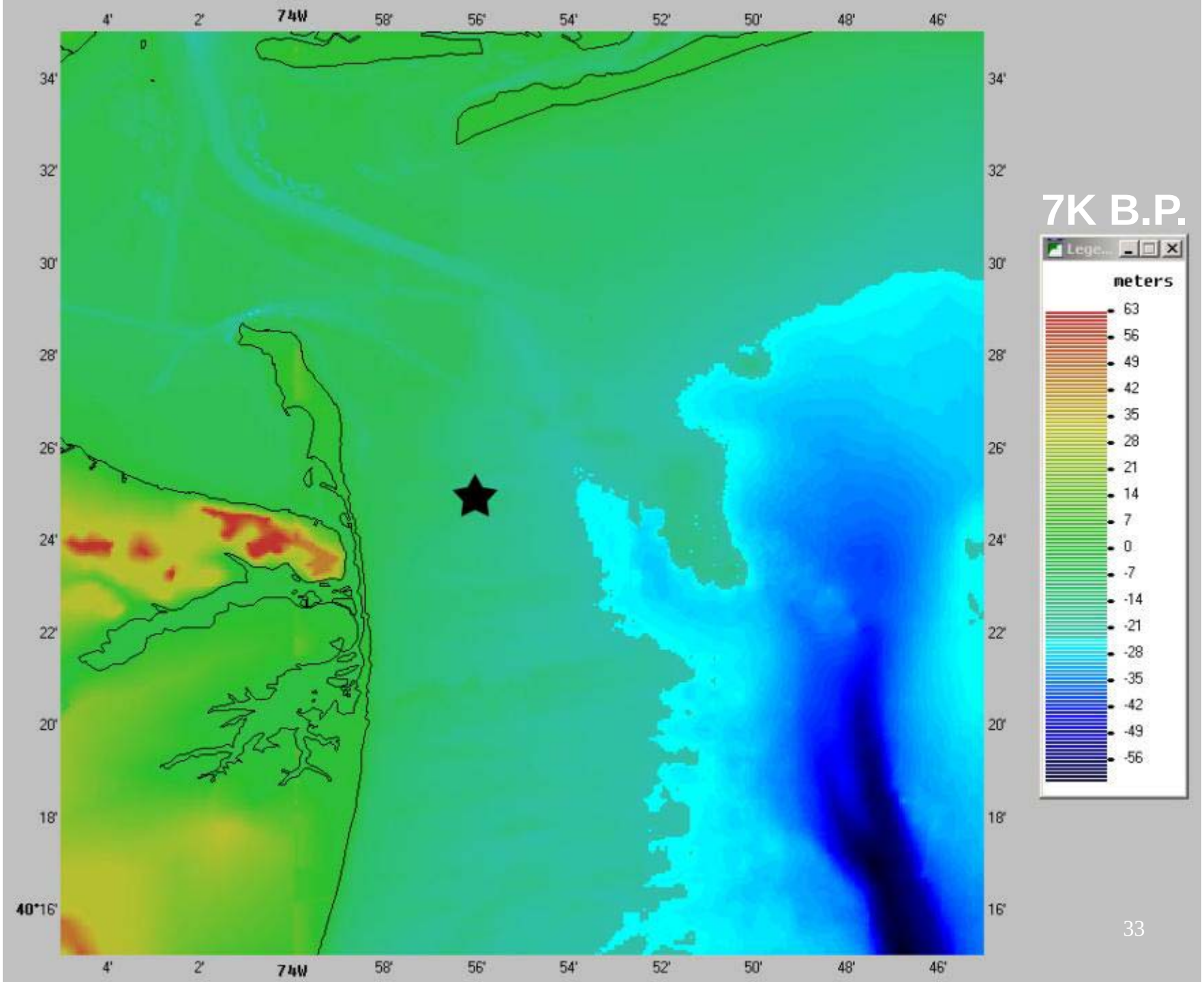
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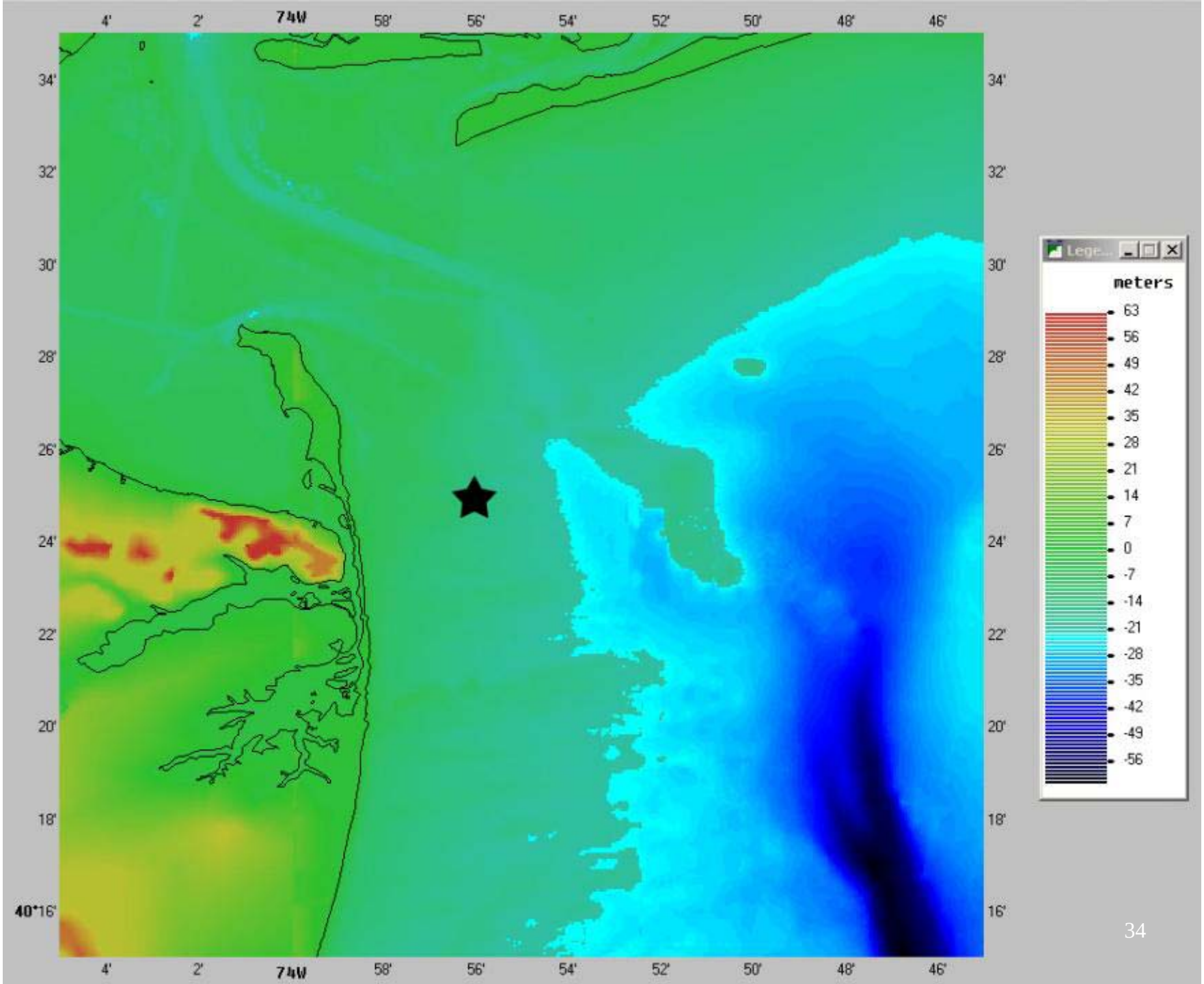
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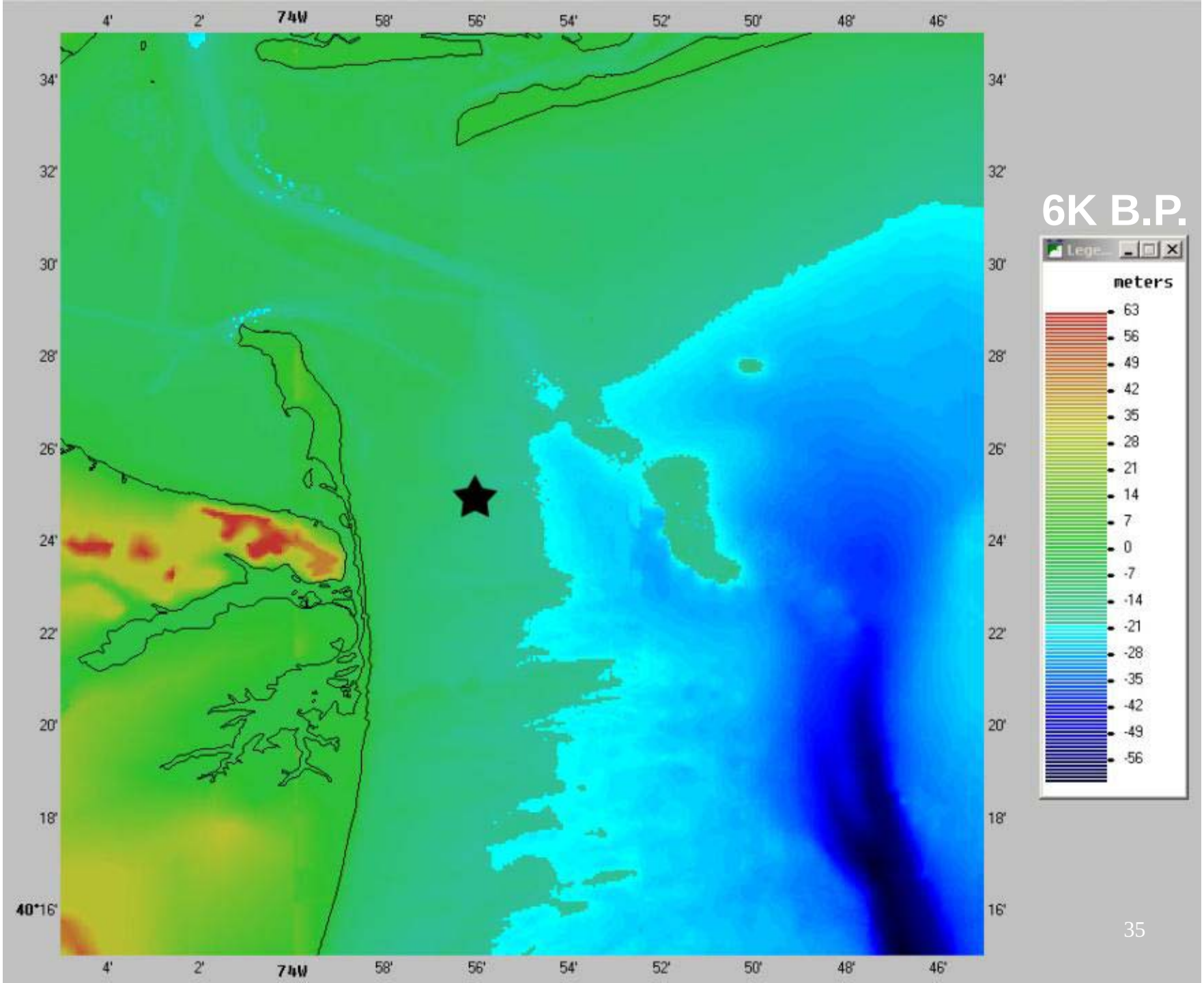
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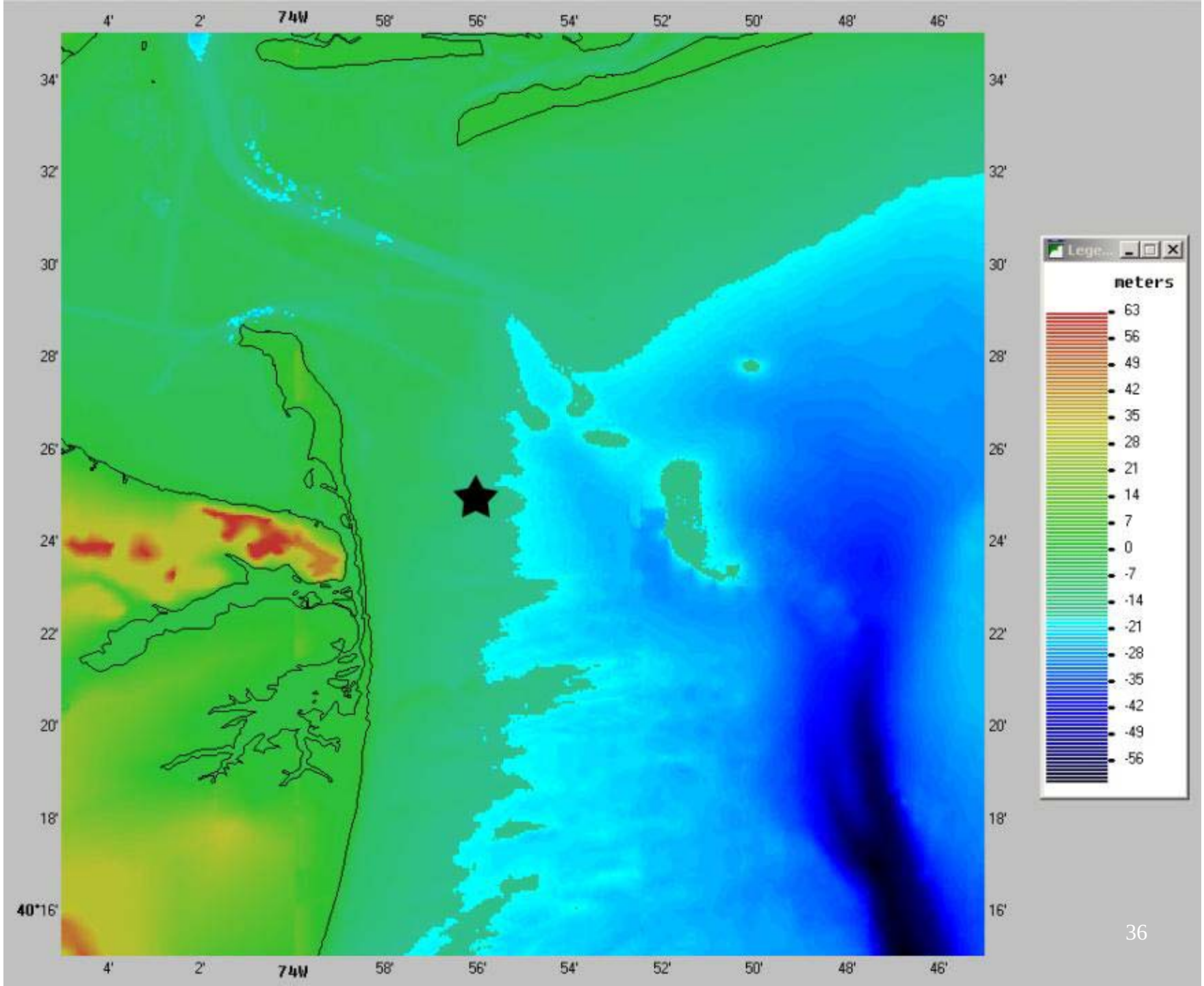
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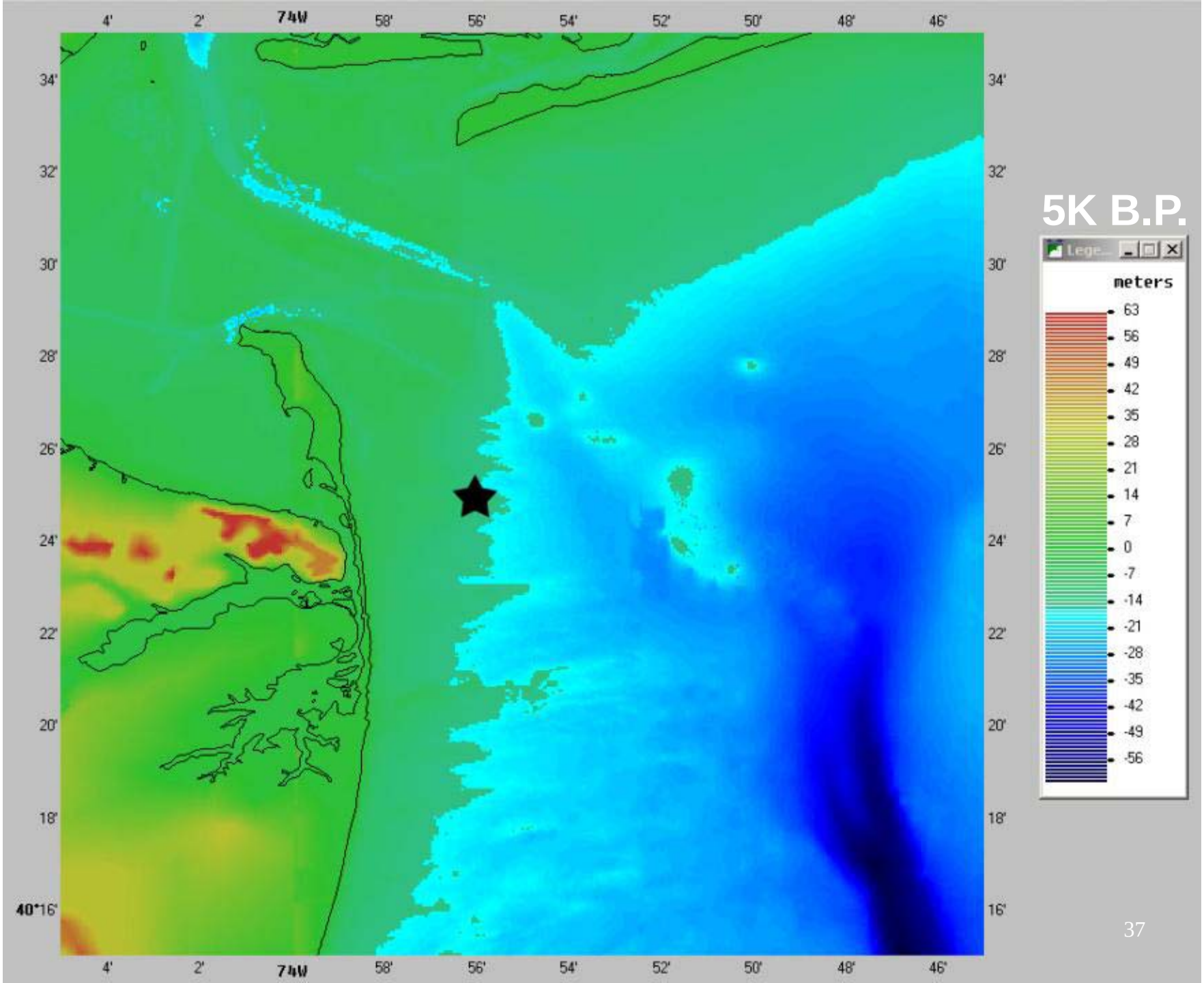
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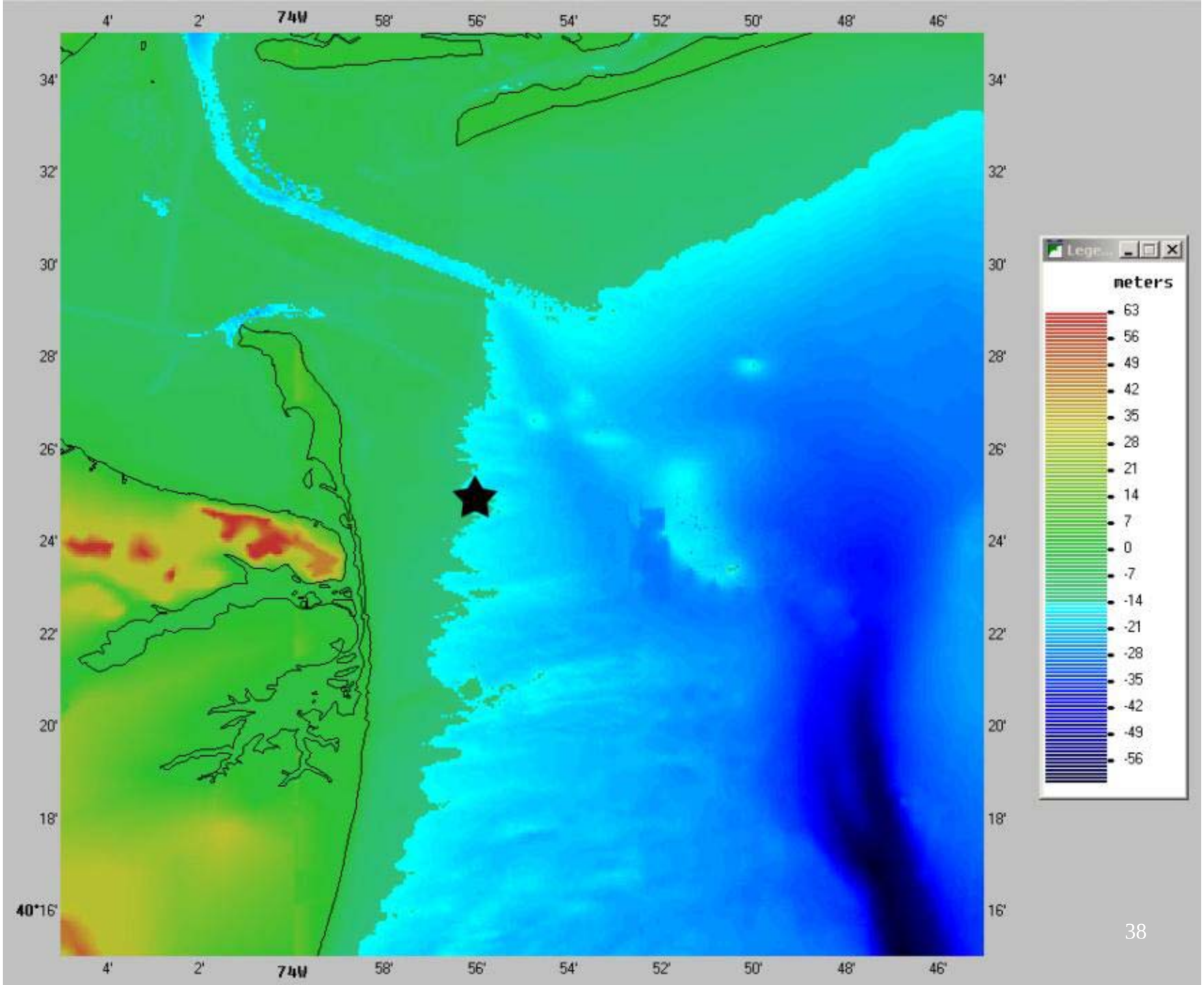
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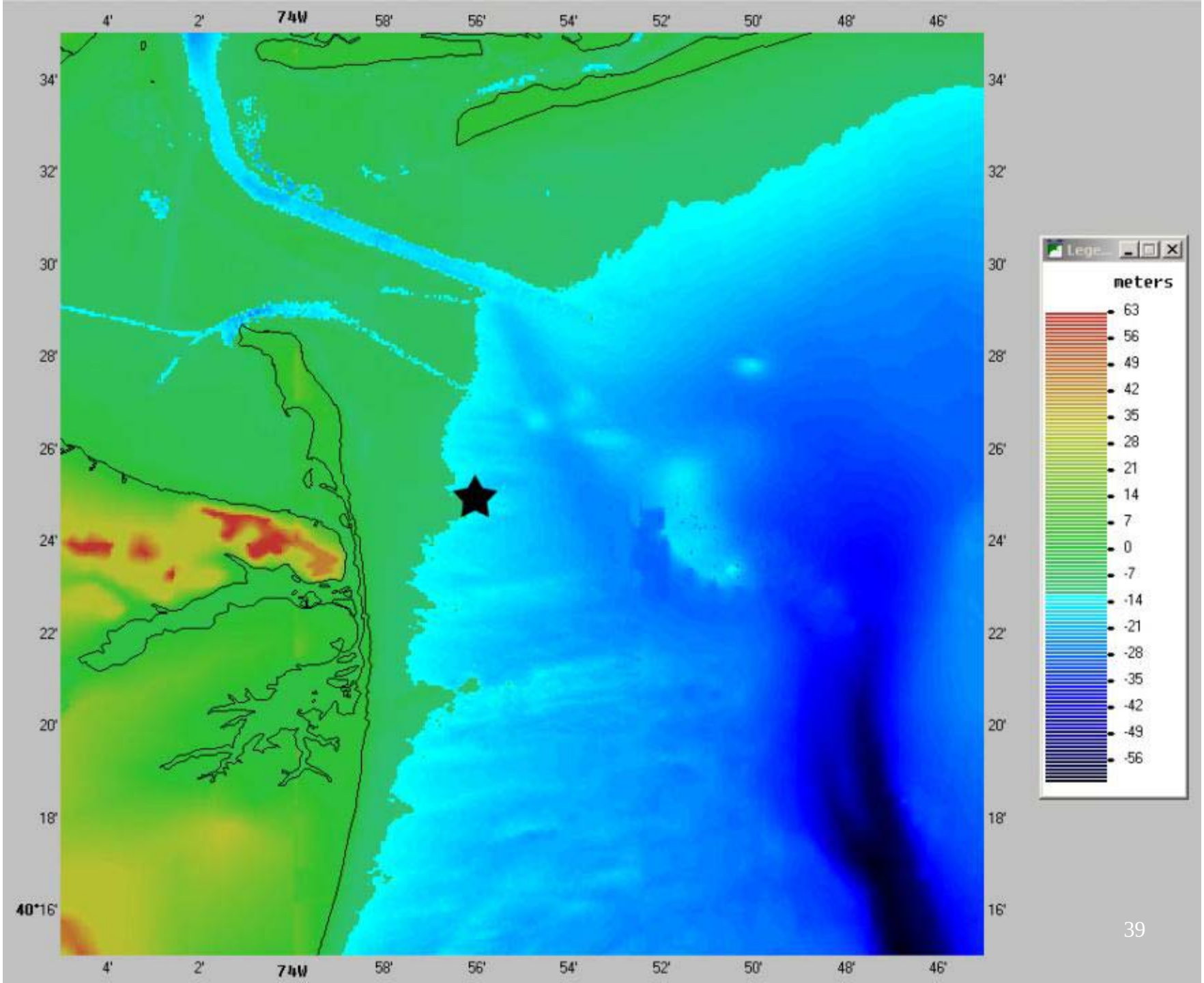
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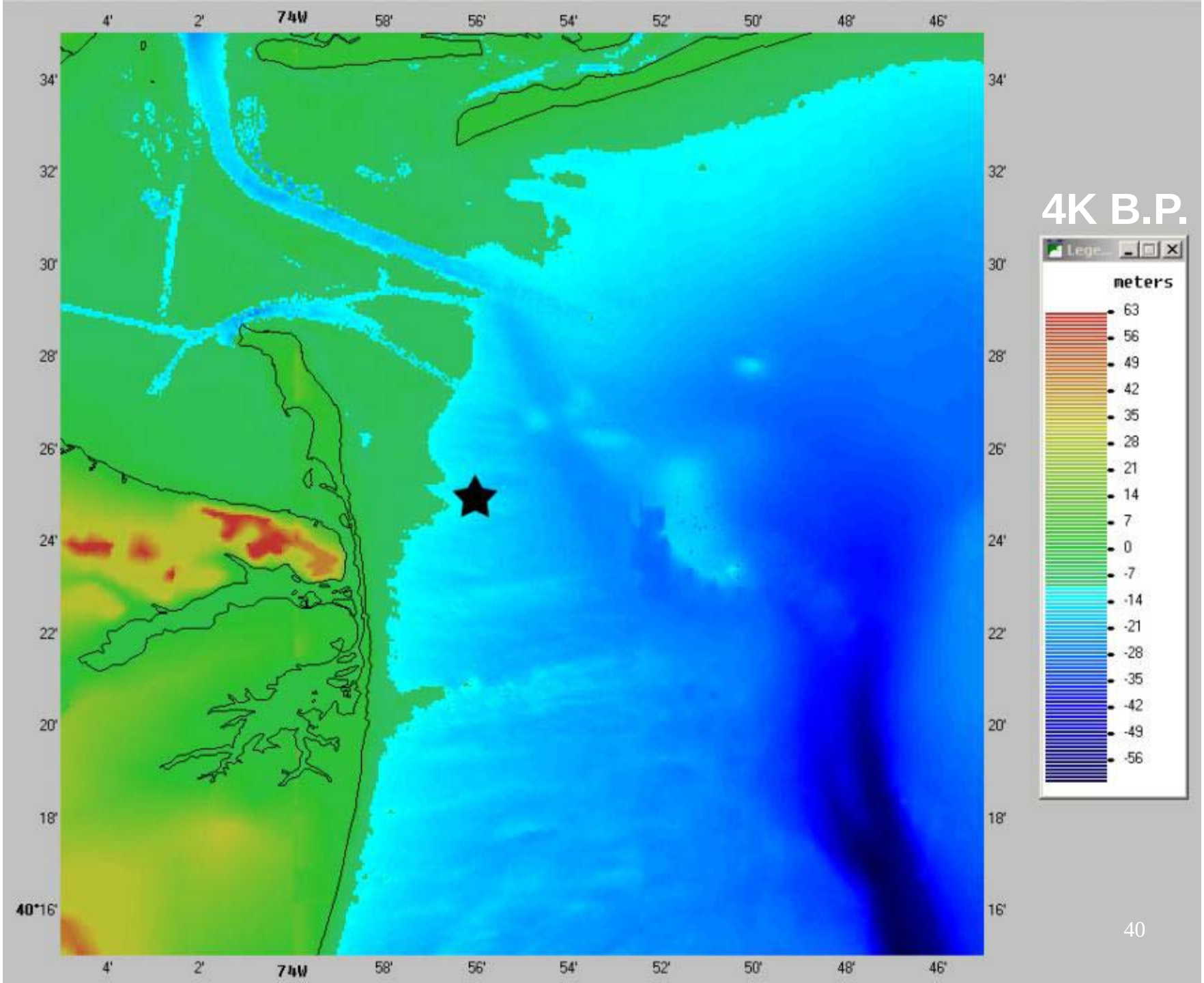
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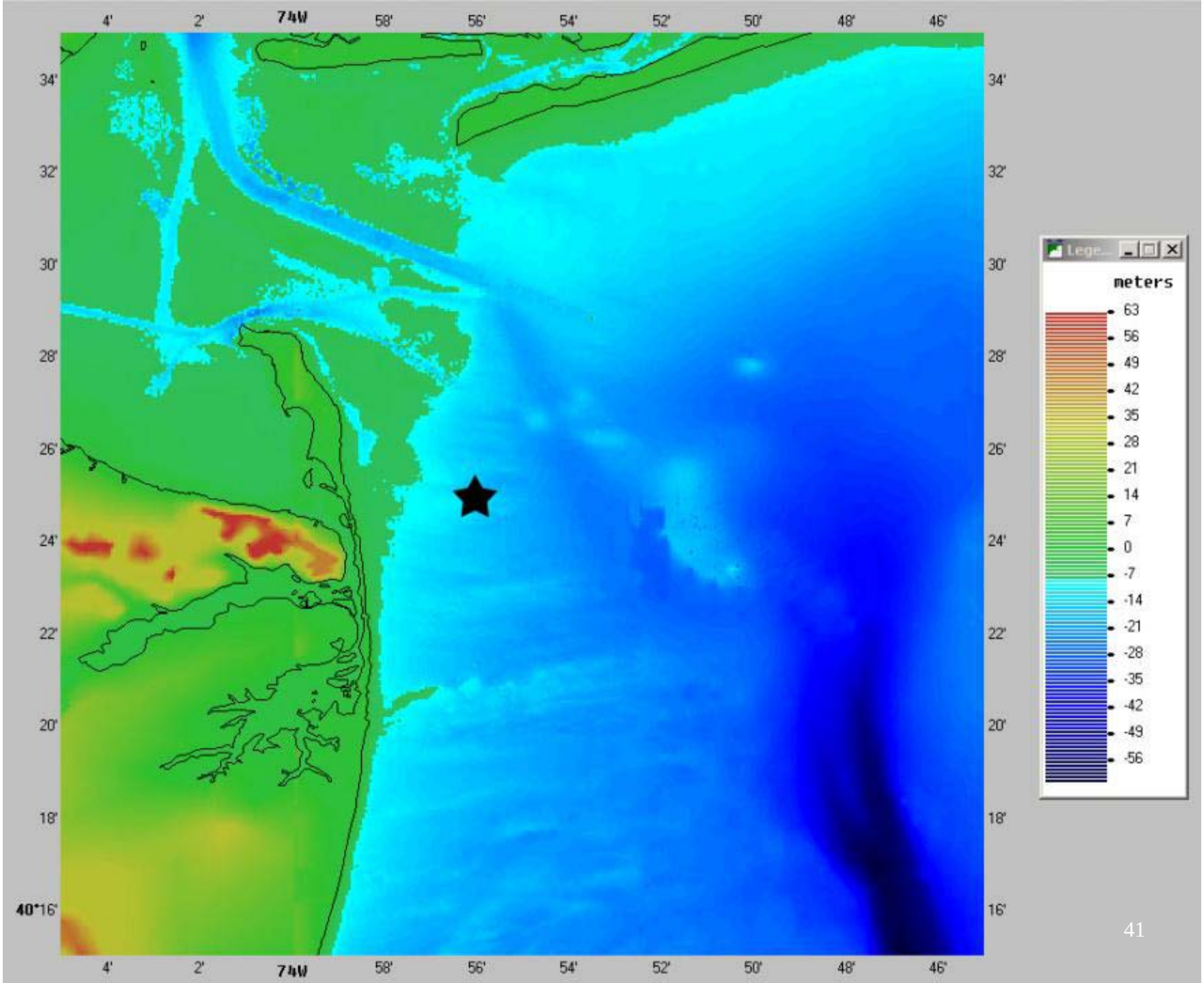
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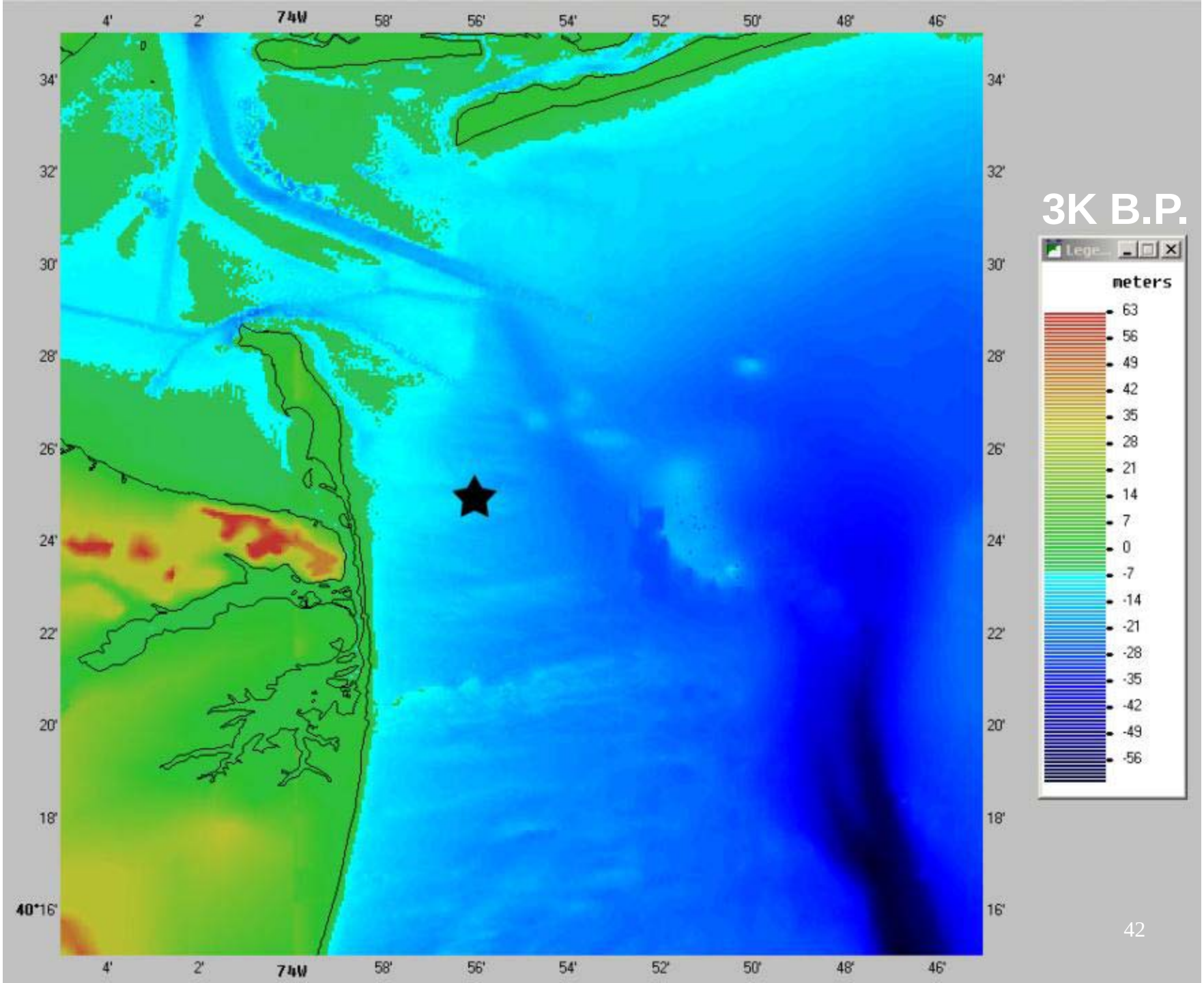
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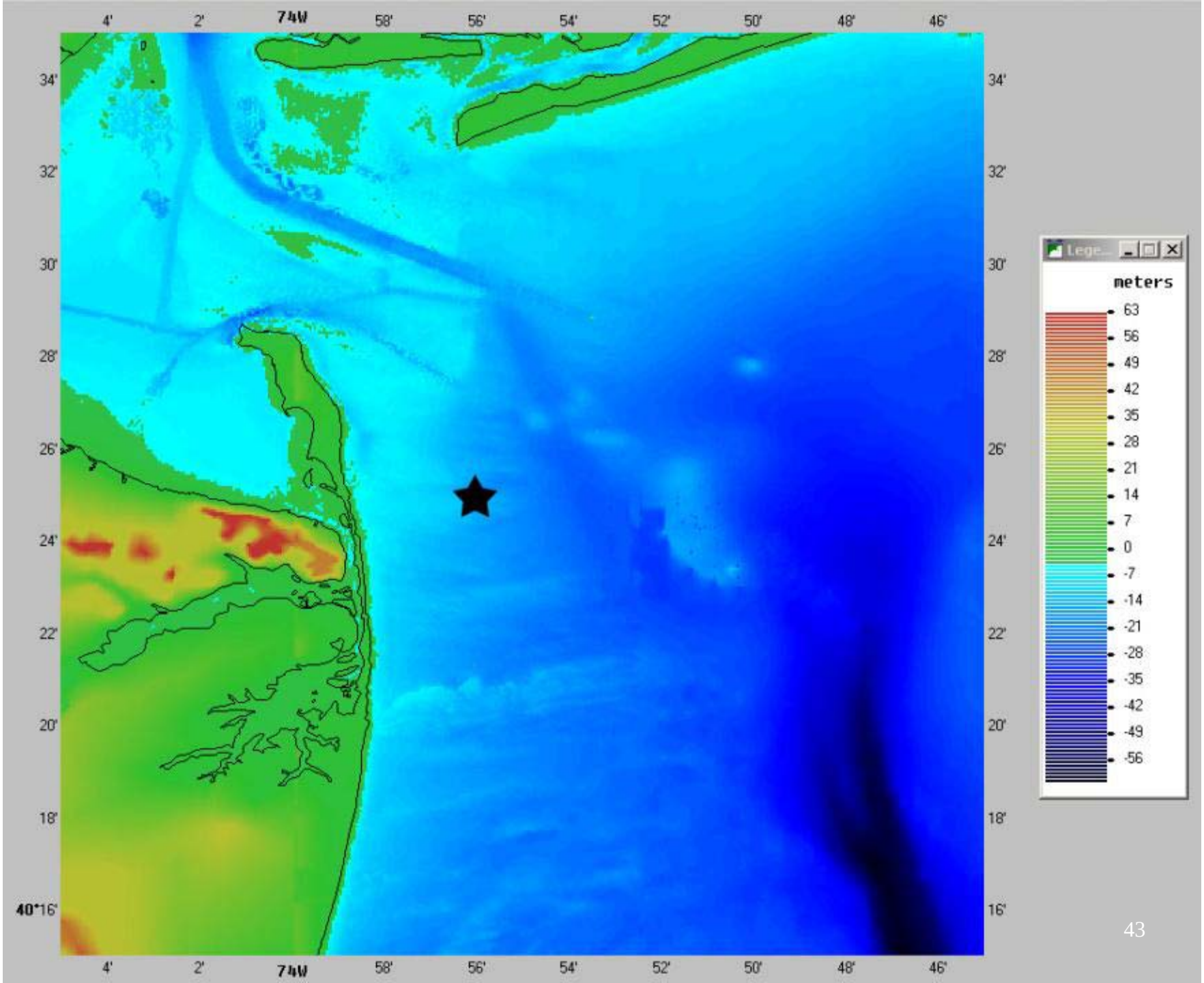
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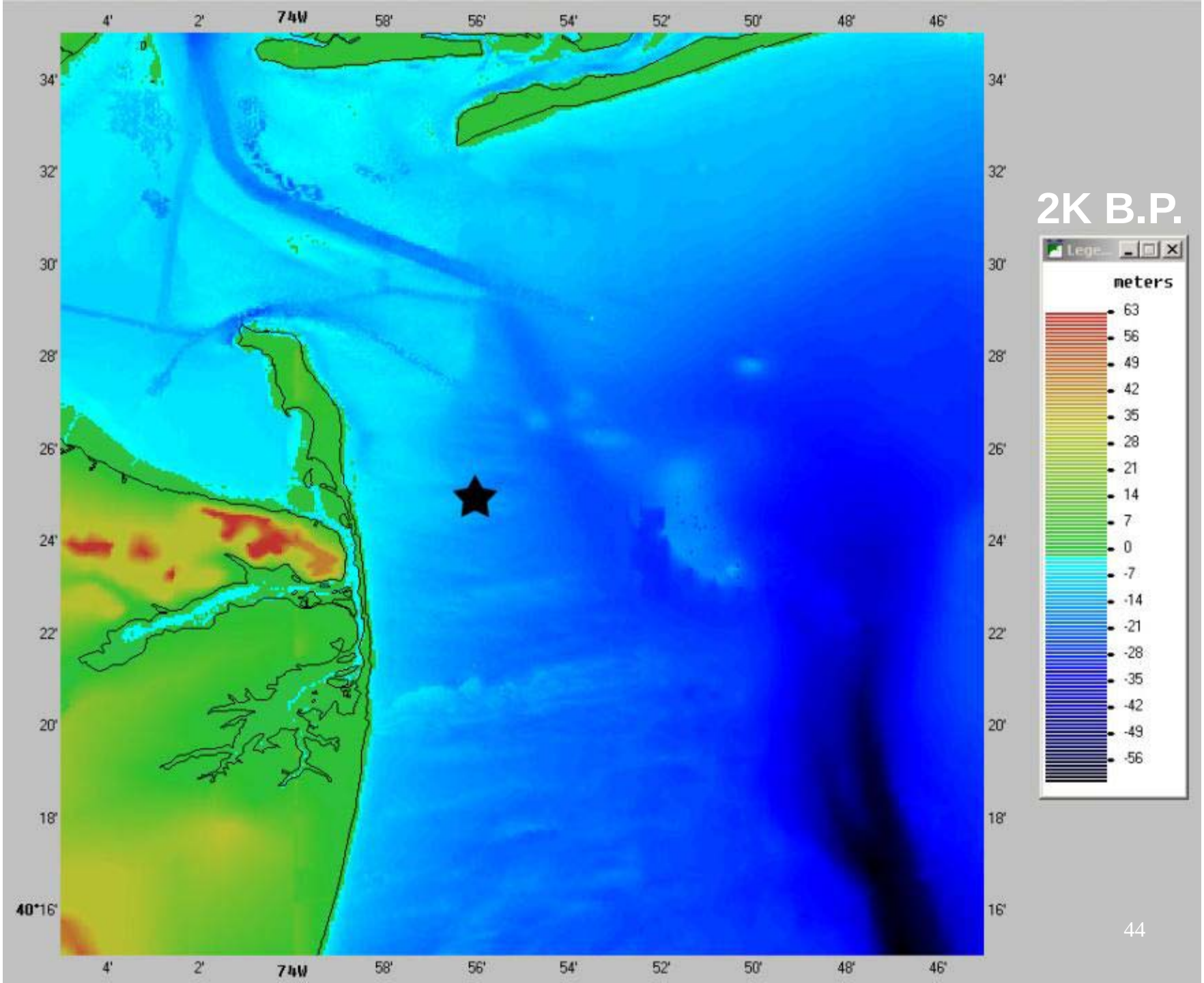
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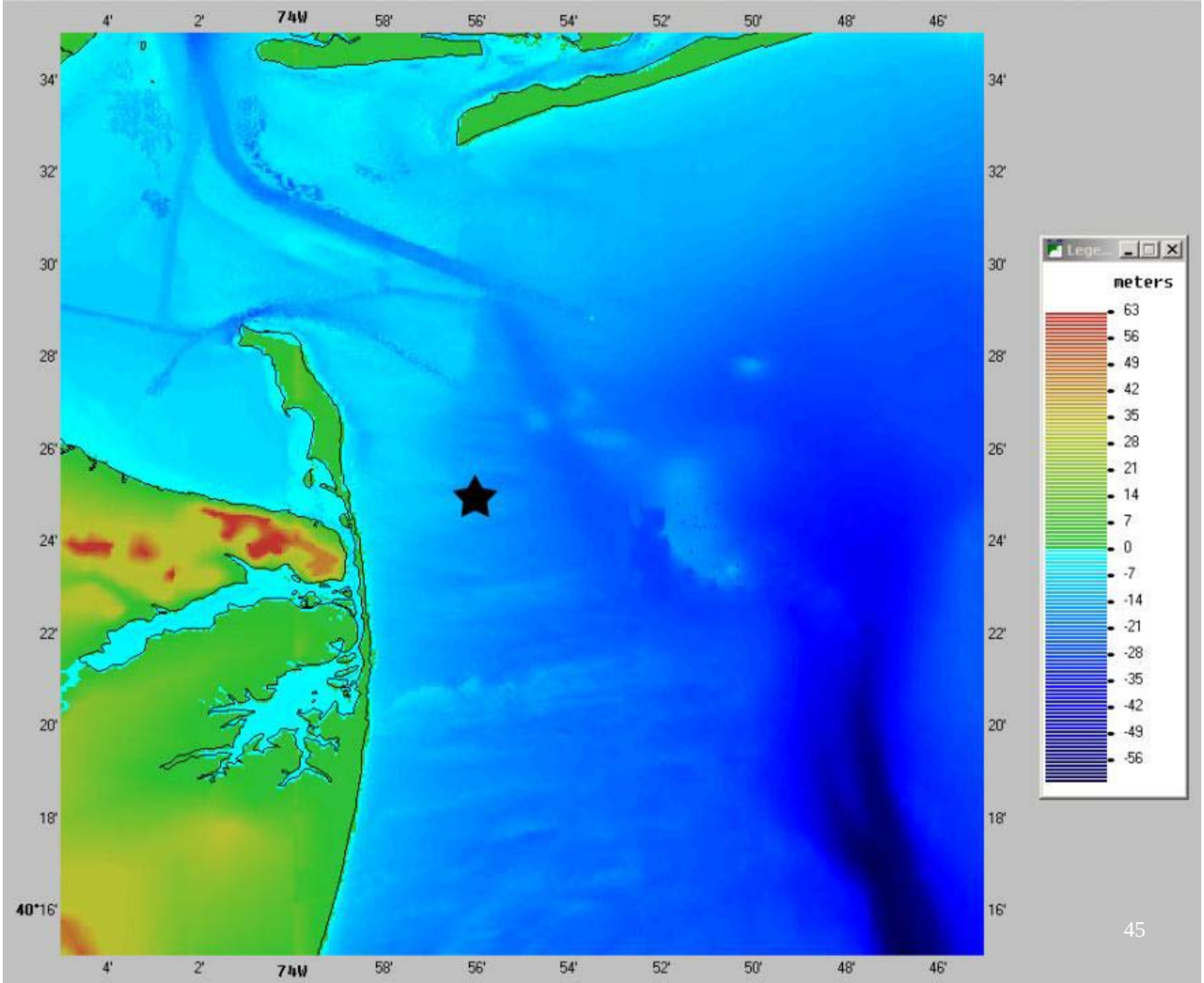
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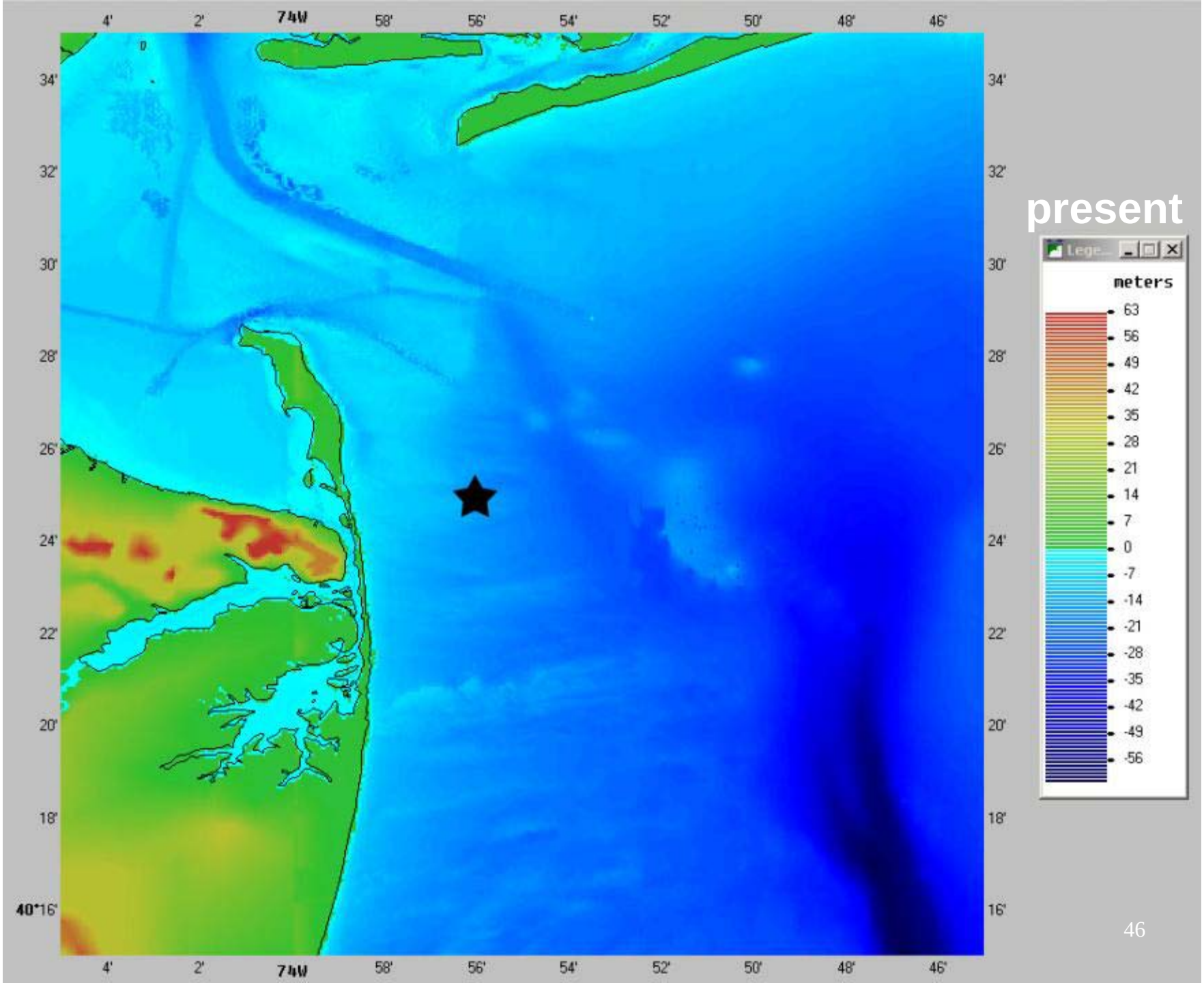
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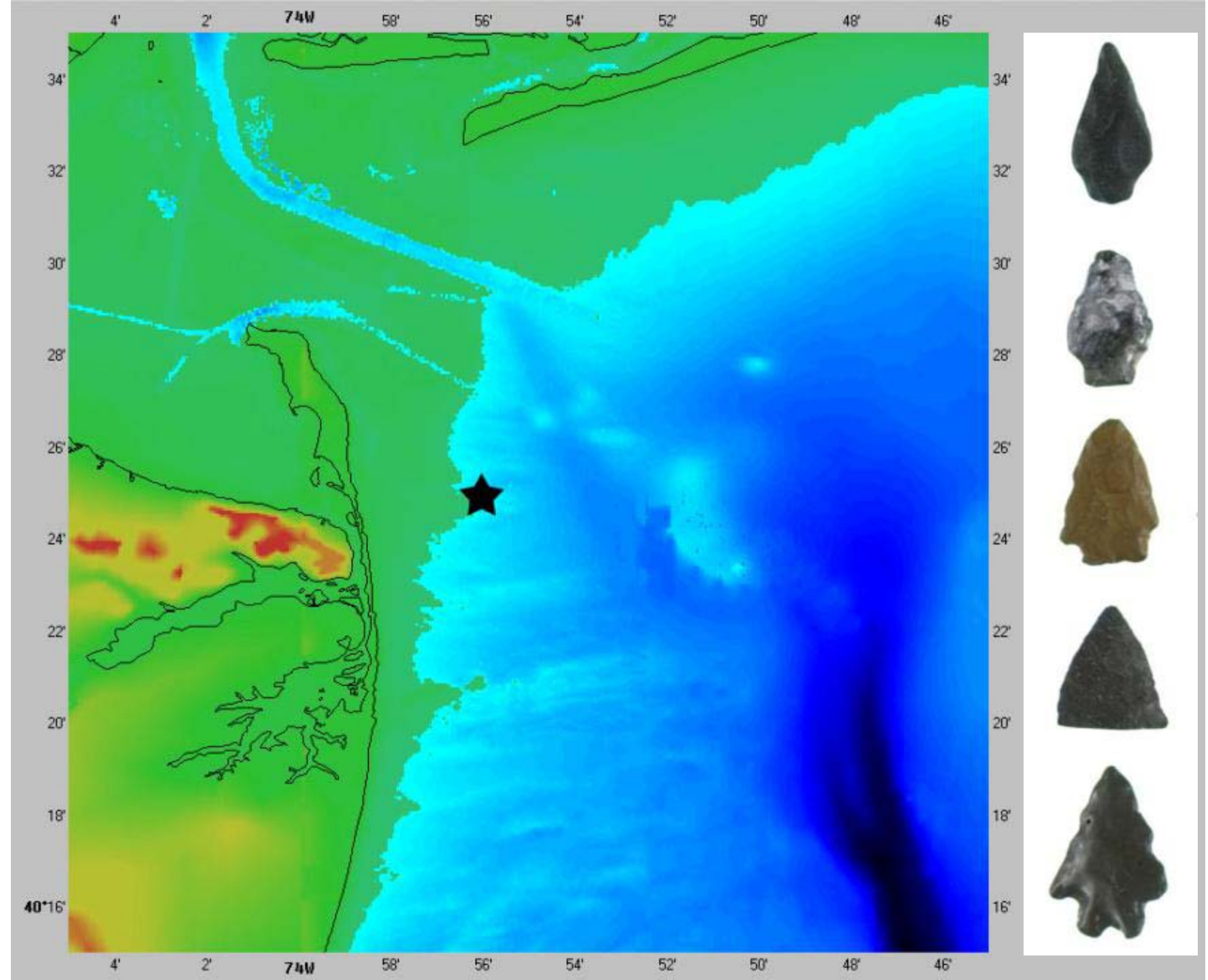
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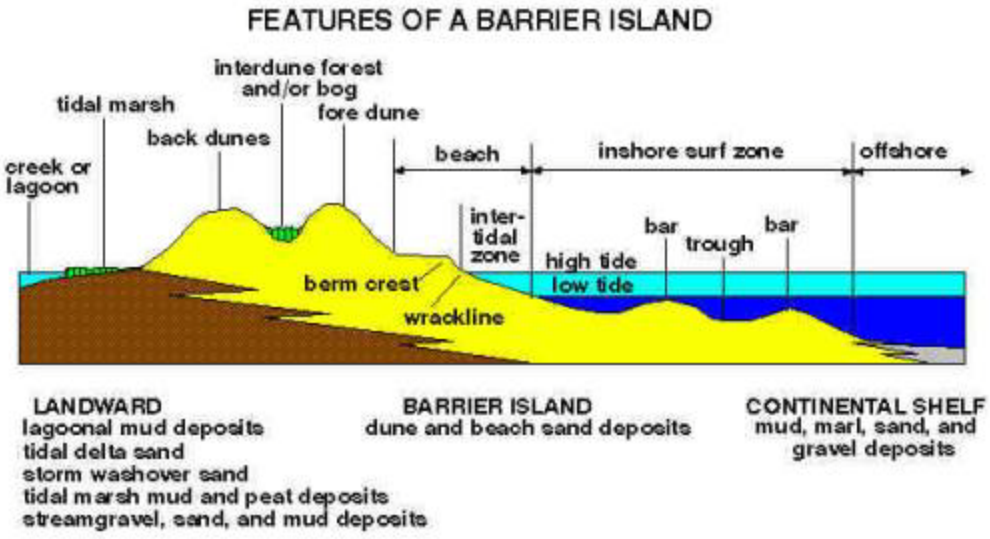
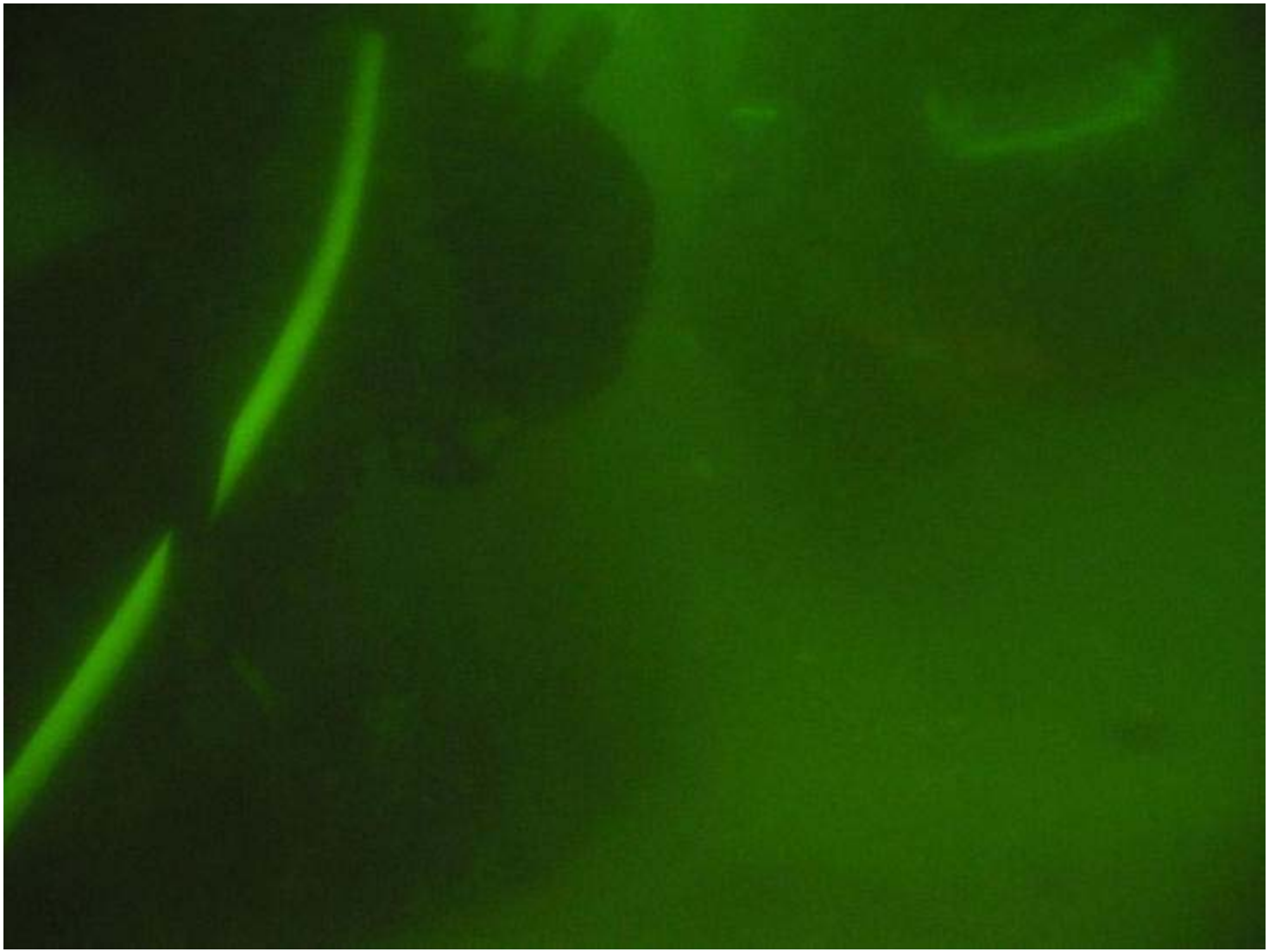

FEATURES OF A BARRIER ISLAND
interdune forest and/or bog
tidal marsh
fore dune
back dunes
creek or lagoon
beach
inshore surf zone
offshore
inter-tidal zone
bar
trough
bar
high tide
low tide
berm crest
wrackline
LANDWARD
lagoonal mud deposits
tidal delta sand
storm washover sand
tidal marsh mud and peat deposits
streamgravel, sand, and mud deposits
BARRIER ISLAND
dune and beach sand deposits
CONTINENTAL SHELF
mud, marl, sand, and gravel deposits

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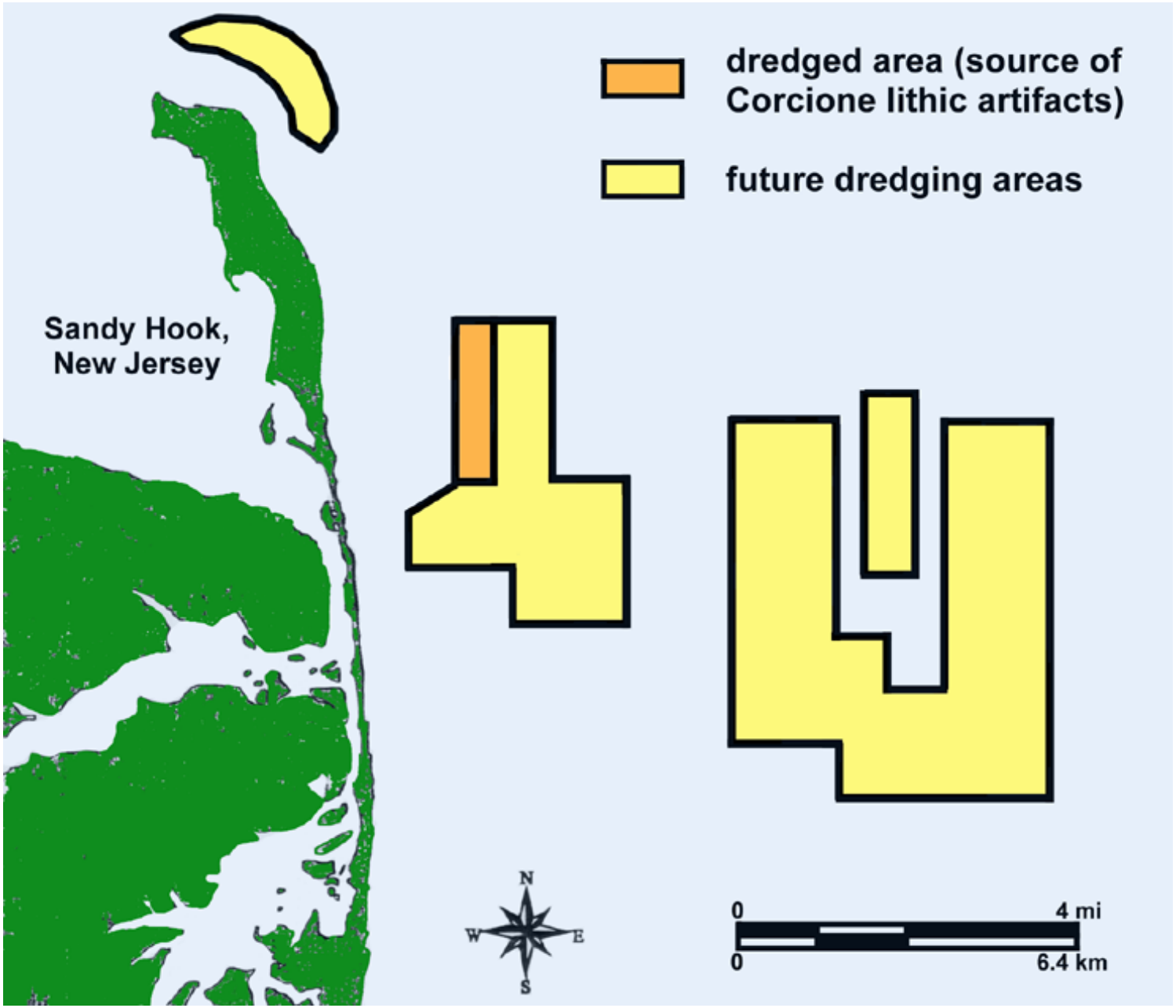
dredged area (source of Corcione lithic artifacts)
future dredging areas
Sandy Hook, New Jersey
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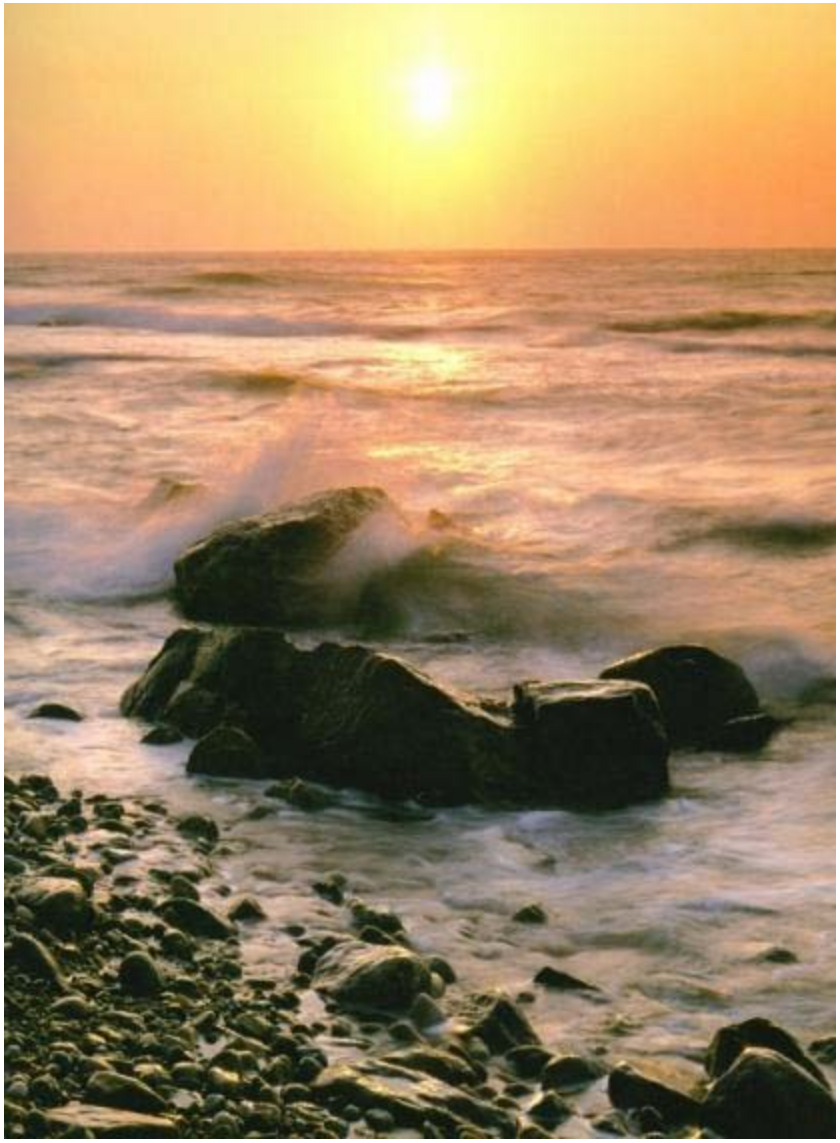
W
E
S
0
4 mi
0
6.4 km

Special Thanks to



- **Brian Jordan and David Ball, BOEMRE**
- **Brian Thomas and others at TRC** for the opportunity to contribute to the Atlantic OCS Archaeological Study
- dissertation committee members

  David Bernstein, **John Shea**, **Elizabeth Stone**, **Nina Versaggi**
- **Dana Linck**, former Park Archeologist, Gateway NRA
- **Archaeological Society of New Jersey and Hudson River Foundation**, gratefully acknowledged for funding
- **Helene Corcione**

References

Emery, K.O. and R. Edwards. 1966, Archaeological potential of the Atlantic continental shelf. American Antiquity 31:733–737.

Funk, R.E. 1976. Recent Contributions to Hudson Valley Prehistory. New York State Museum Memoir 22, The University of the State of New York, Albany.

Snow, D.R. 1980. The archaeology of New England. New York: Adademic Press. 379 pp.