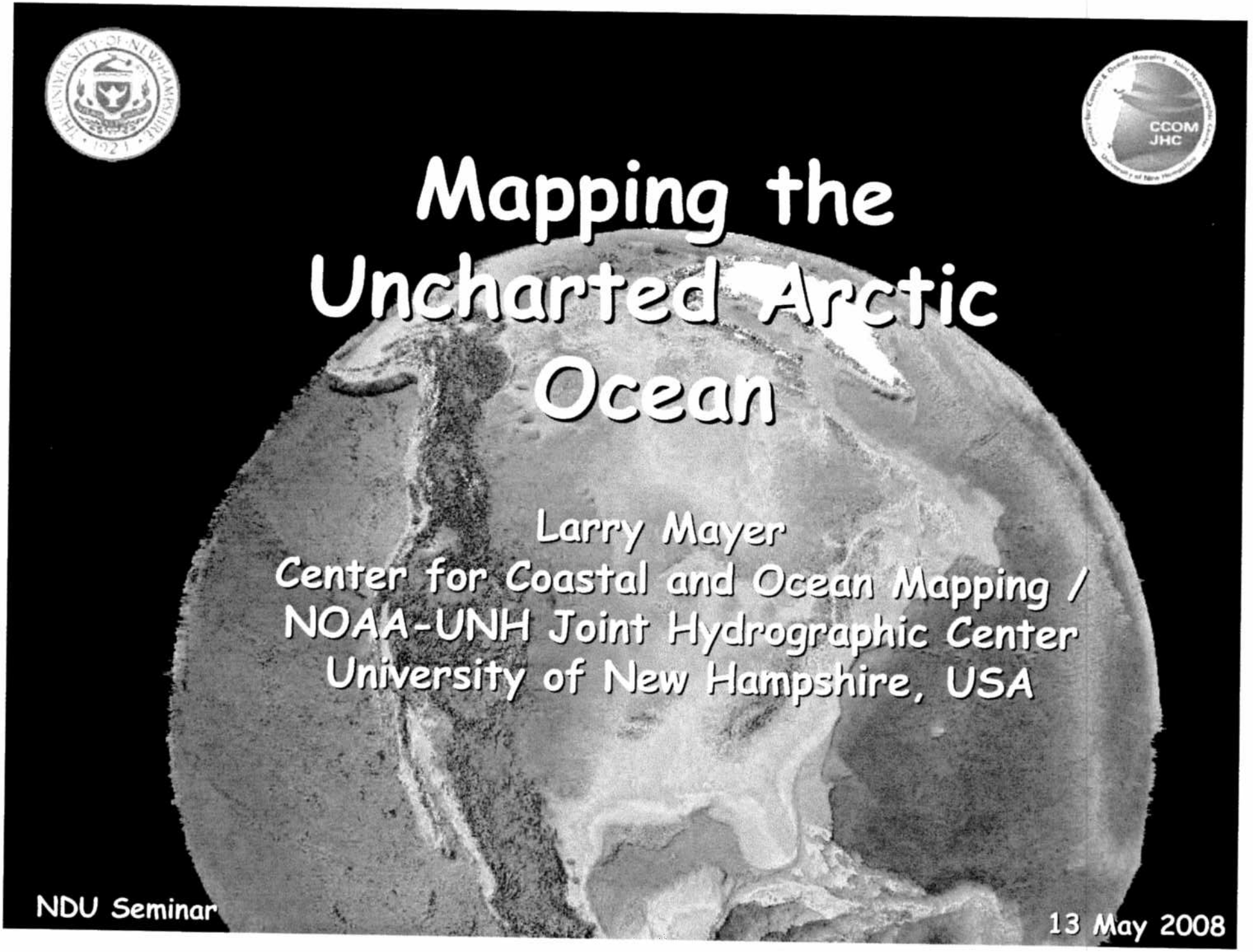


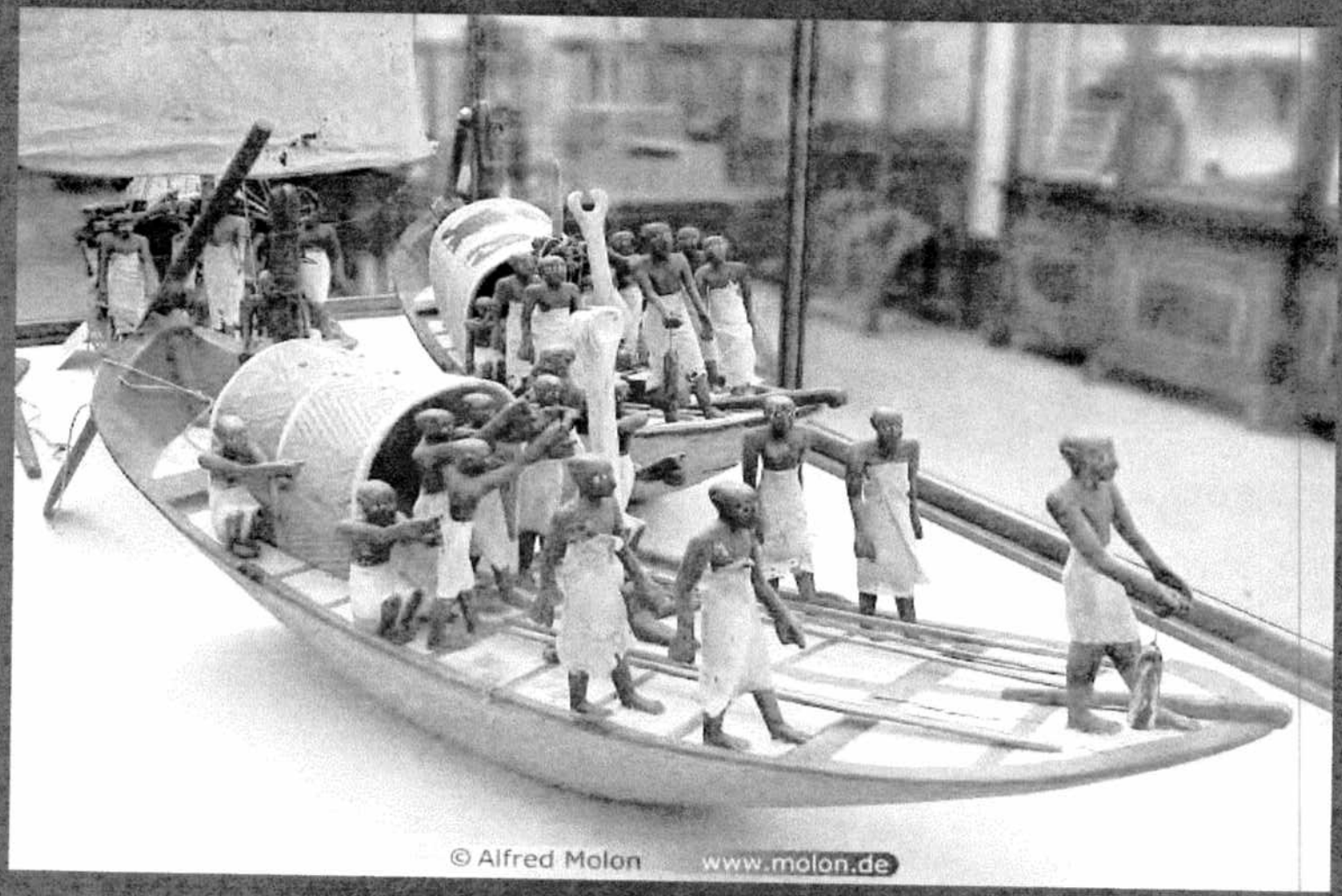
Mapping the Uncharted Arctic Ocean

Larry Mayer
Center for Coastal and Ocean Mapping /
NOAA-UNH Joint Hydrographic Center
University of New Hampshire, USA

NDU Seminar

13 May 2008

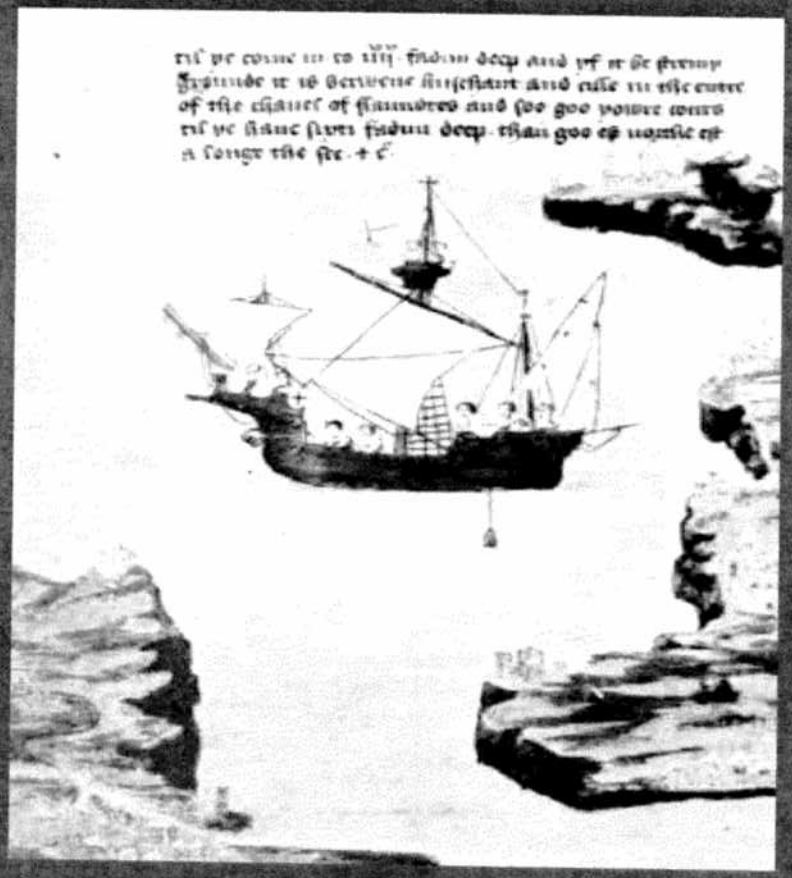
The Lead Line



Boat model retrieved from the tomb of Meket-re who was buried at Thebes in about 2000 BC. From, The Ocean Basins:Their Structure and Evolution , The Open University

The History of Ocean Mapping

Lead Line:



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The History of Ocean Mapping

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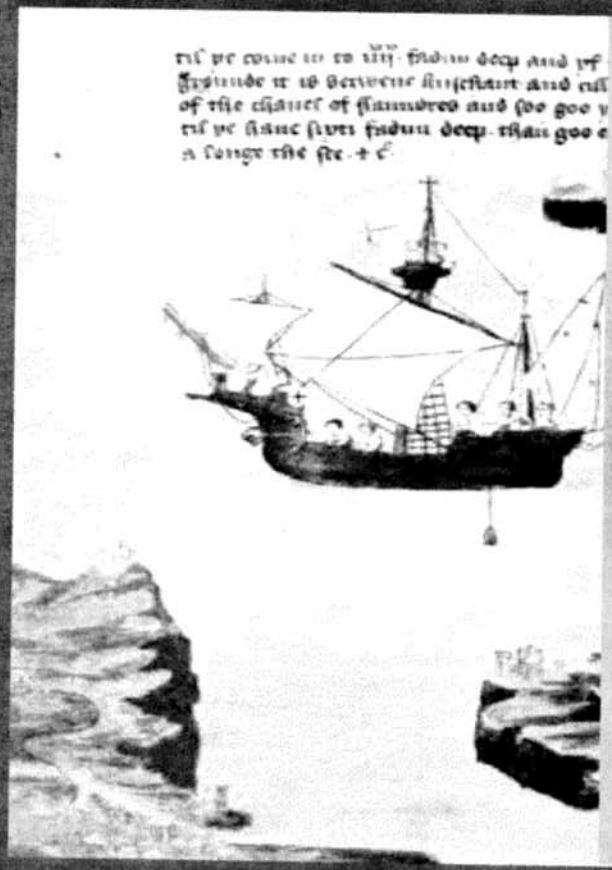

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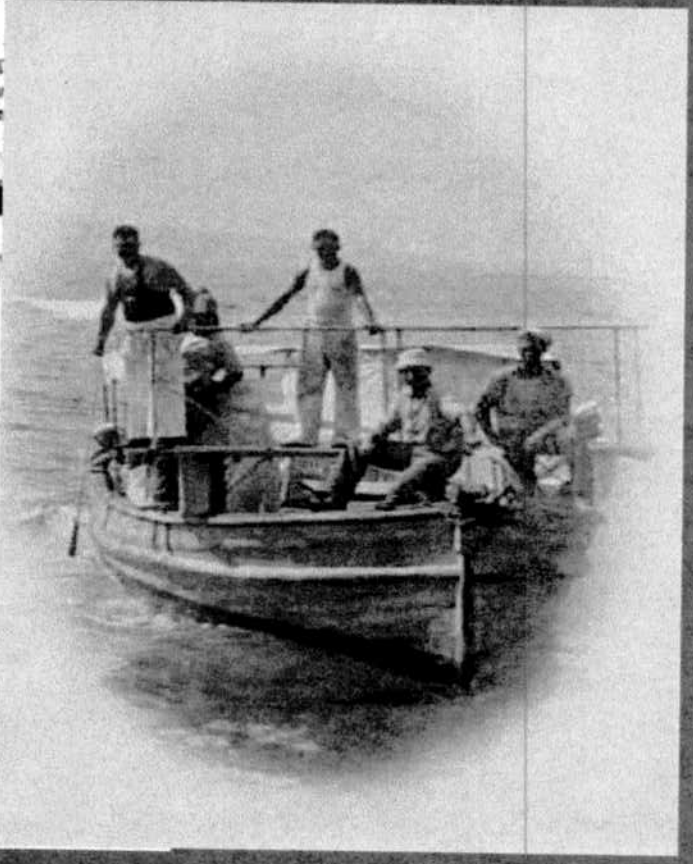

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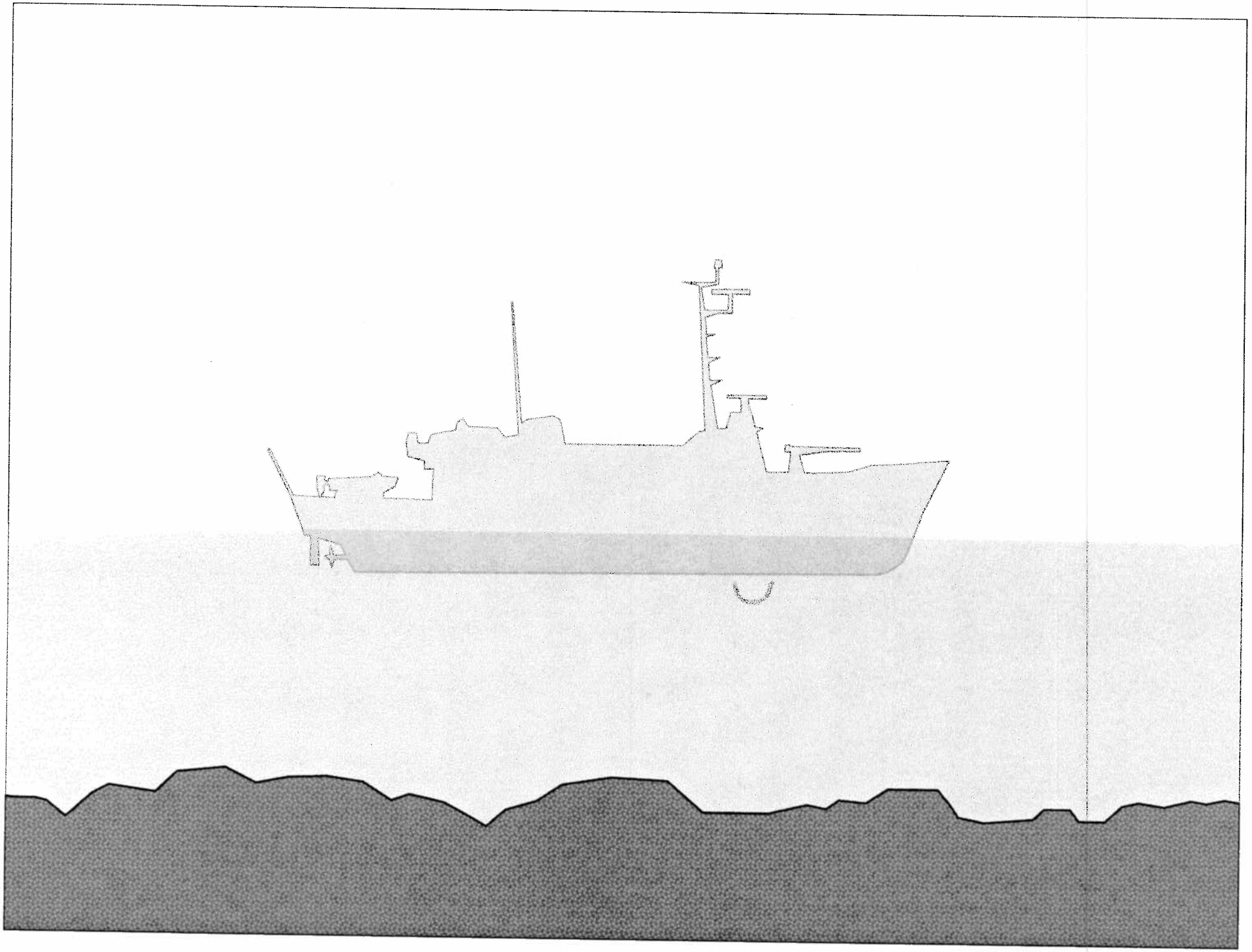
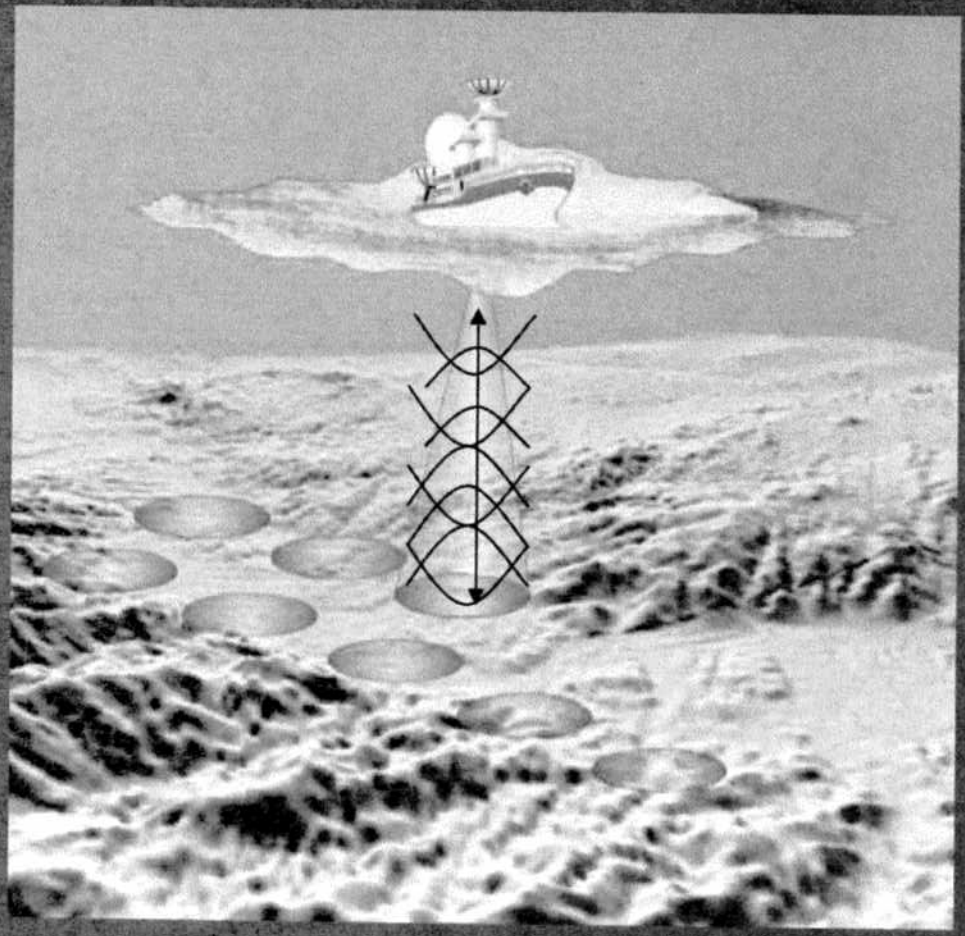
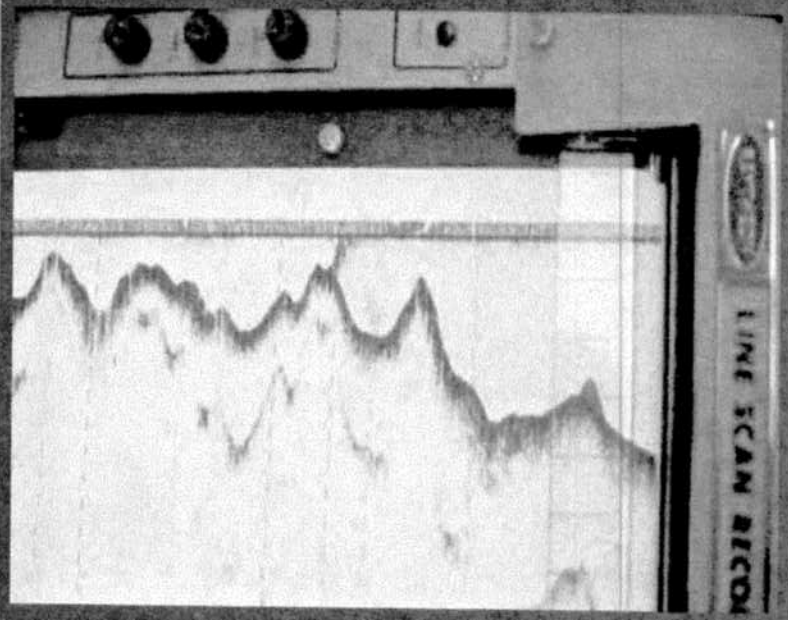
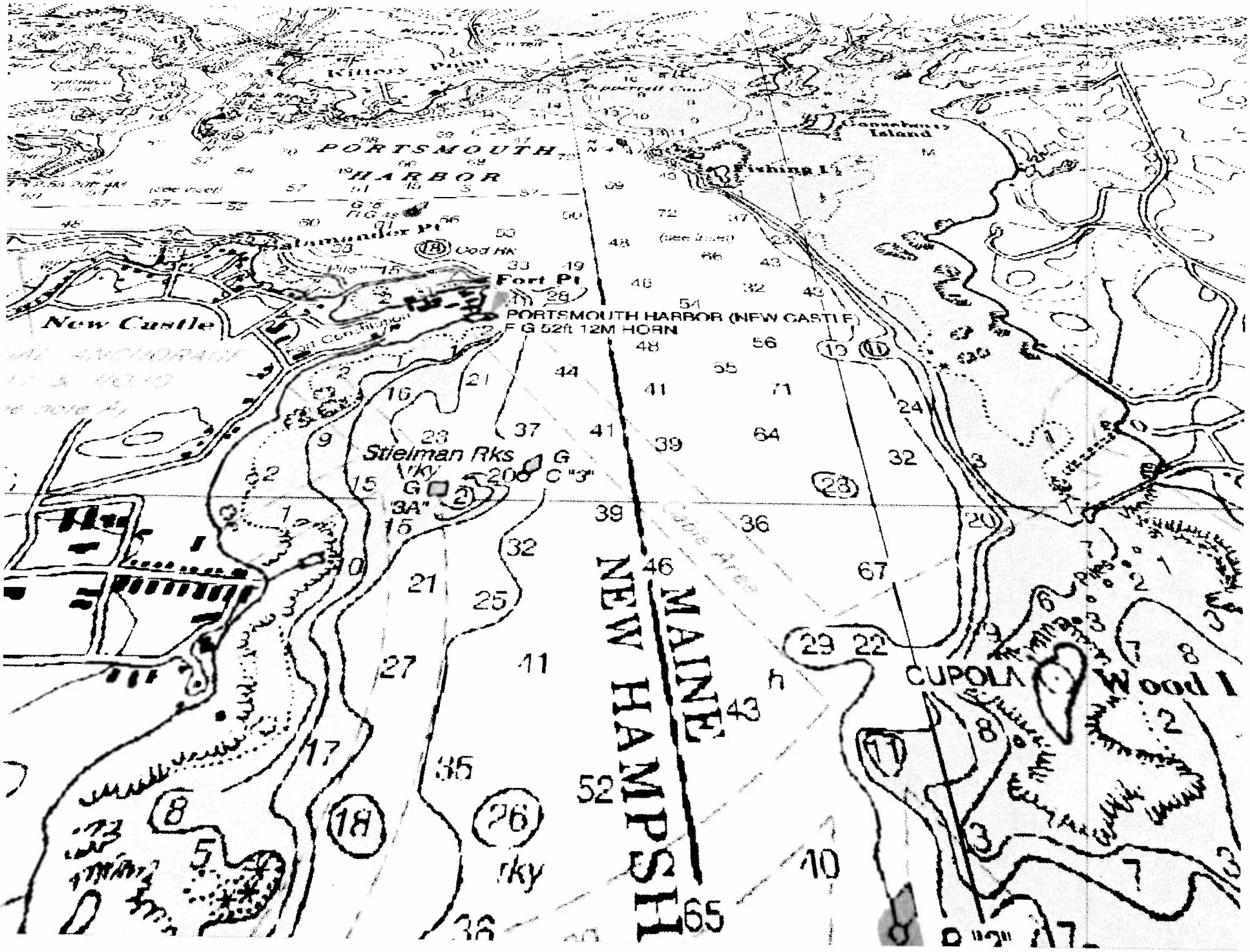
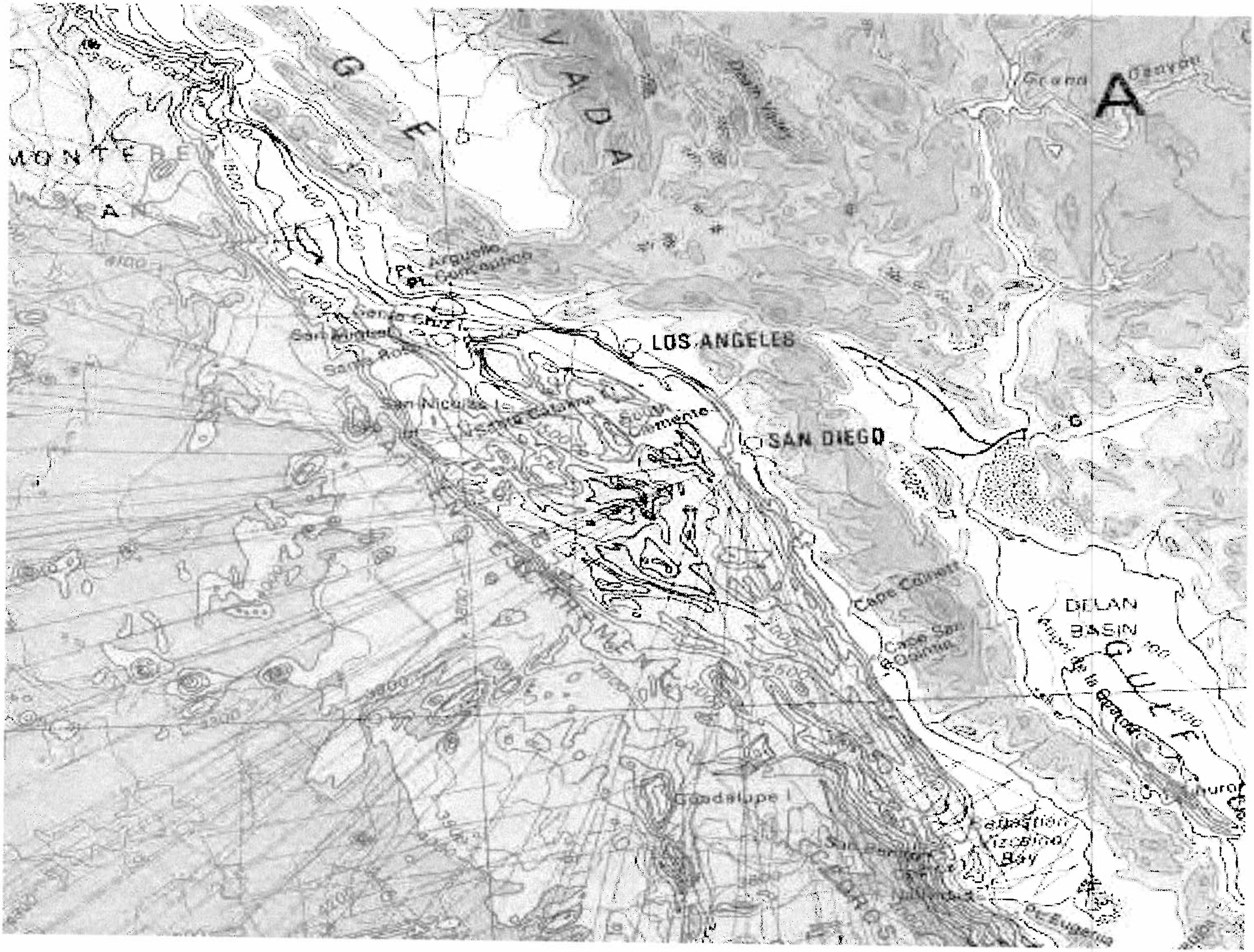


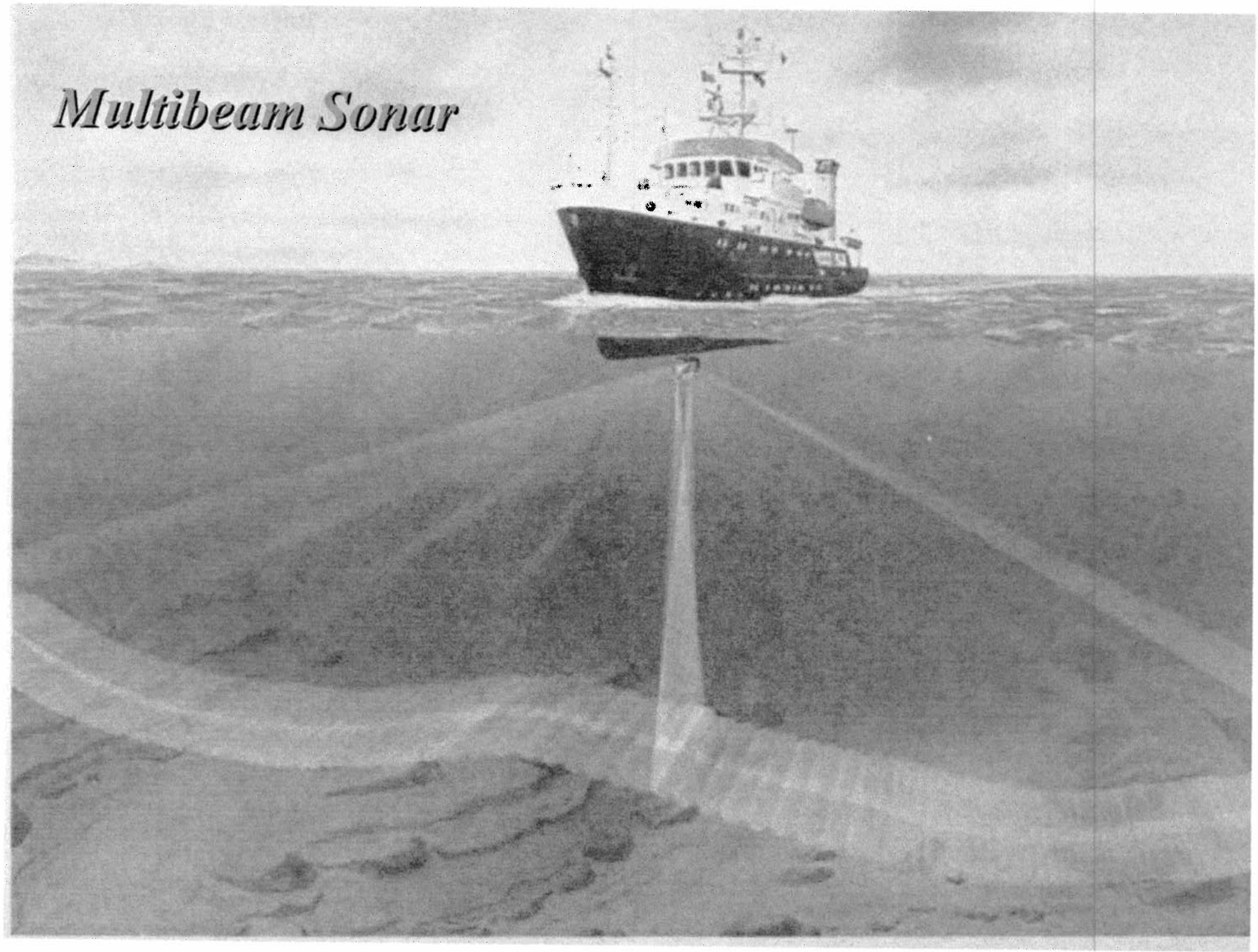
The Echo Sounder






PORTSMOUTH
HARBOR
Fishing Pt
New Castle
PORTSMOUTH HARBOR (NEW CASTLE)
F G 52ft 12M HORN
Stielman Rks
G
C "3"
3A"
NEW HAMPSH
MAINE
CUPOLA


LOS ANGELES
SAN DIEGO
Death Valley
Grand Canyon
Pt. Arguello
Pt. Conception
San Miguel
San Nicolas I.
Cape Colnett
DELAN
BASIN
Guadalupe I.
Vizcaino
Bay


Multibeam Sonar

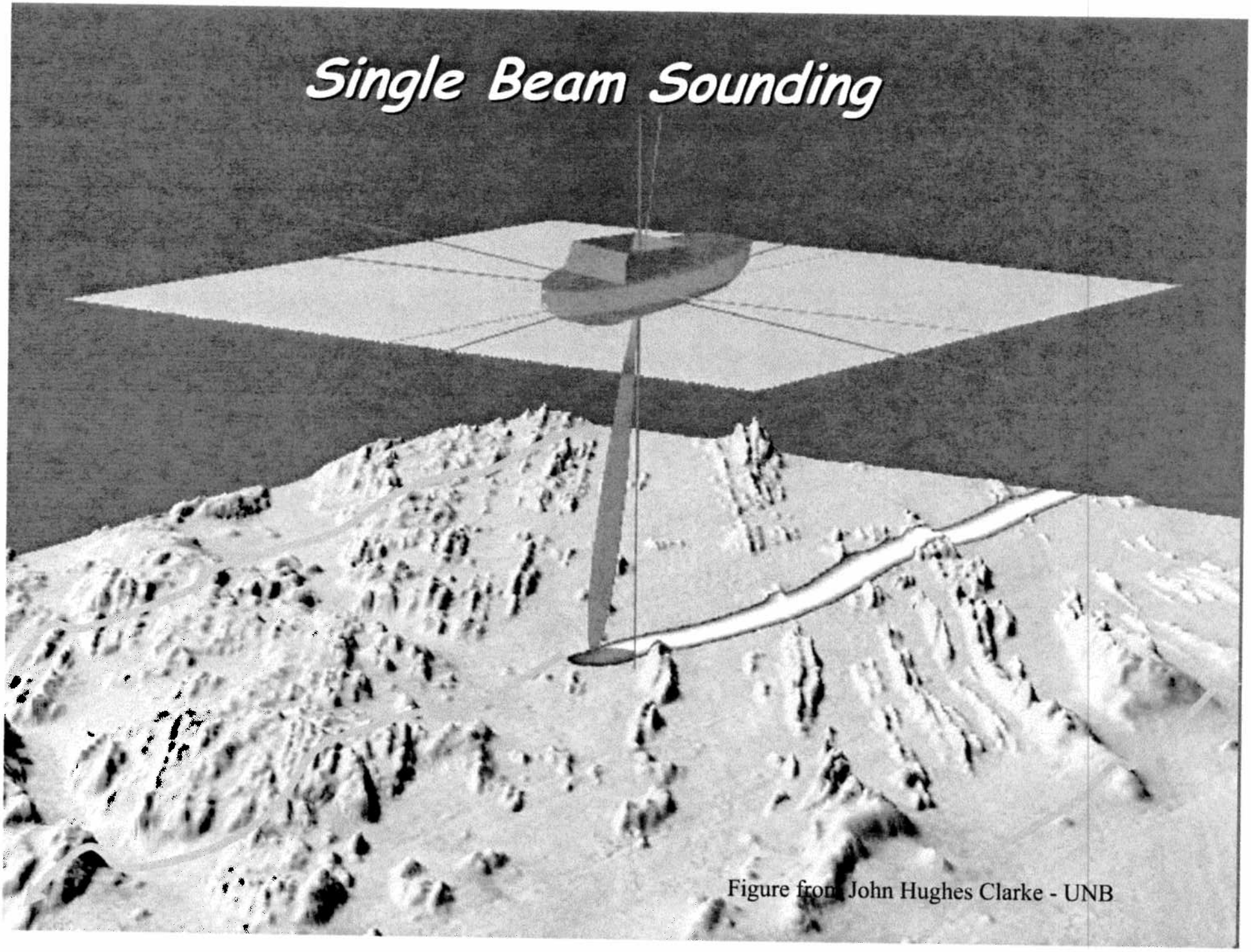


Figure from John Hughes Clarke - UNB

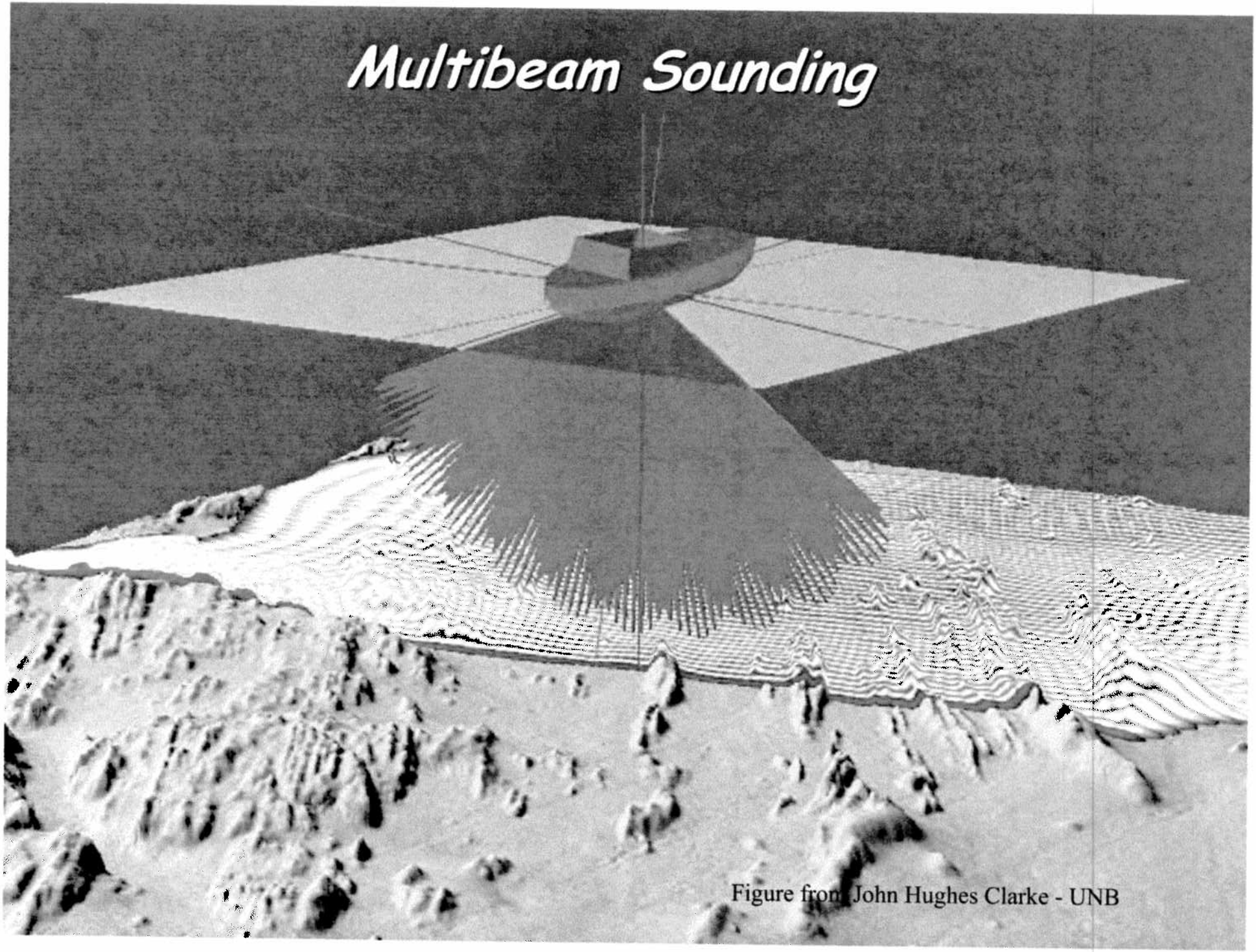
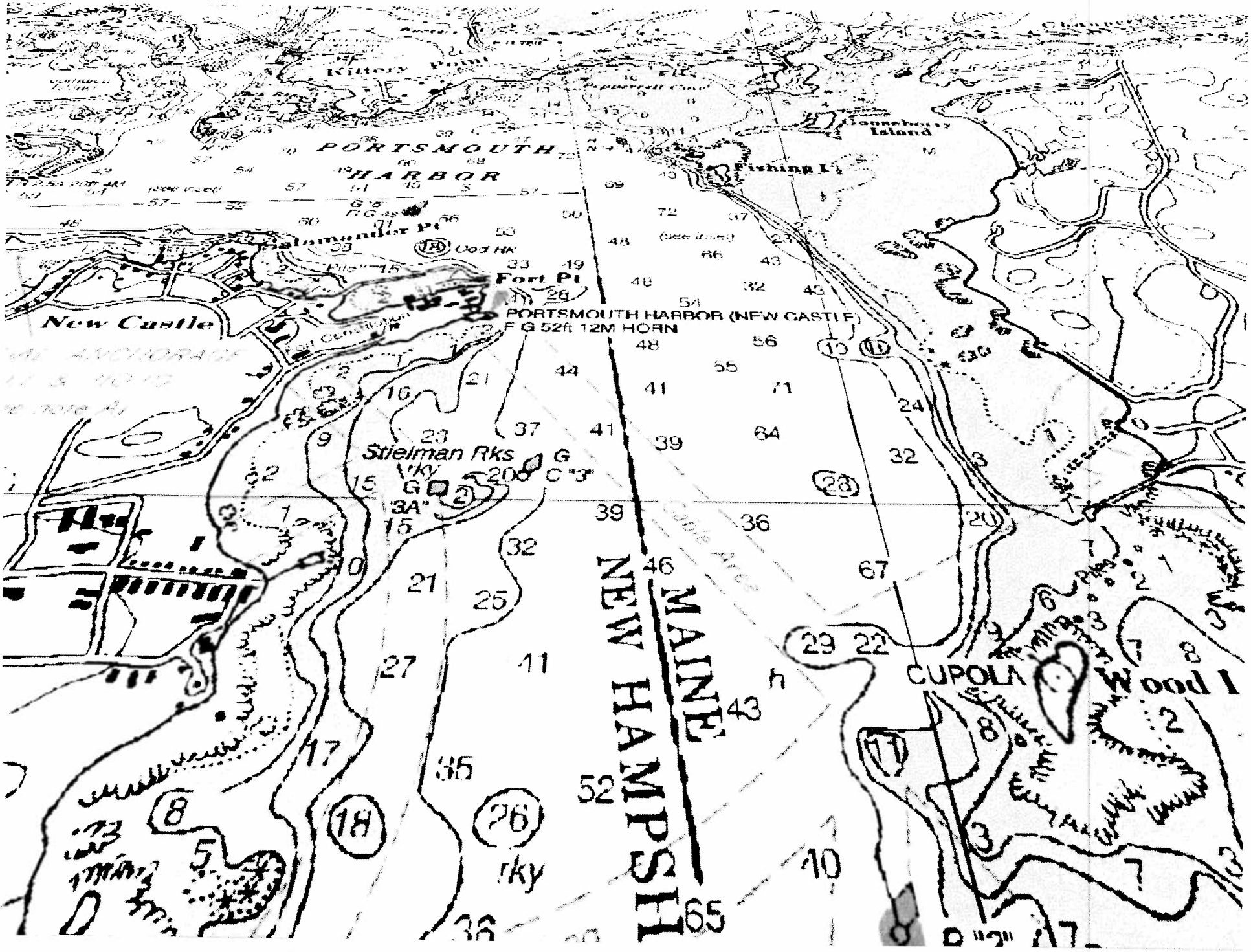


Figure from John Hughes Clarke - UNB


PORTSMOUTH
HARBOR
Kittery Point
Seavey Island
Fishing I.
Salamander Pt
Fort Pt
New Castle
PORTSMOUTH HARBOR (NEW CASTLE)
F G 52ft 12M HORN
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NEW HAMPSHIRE
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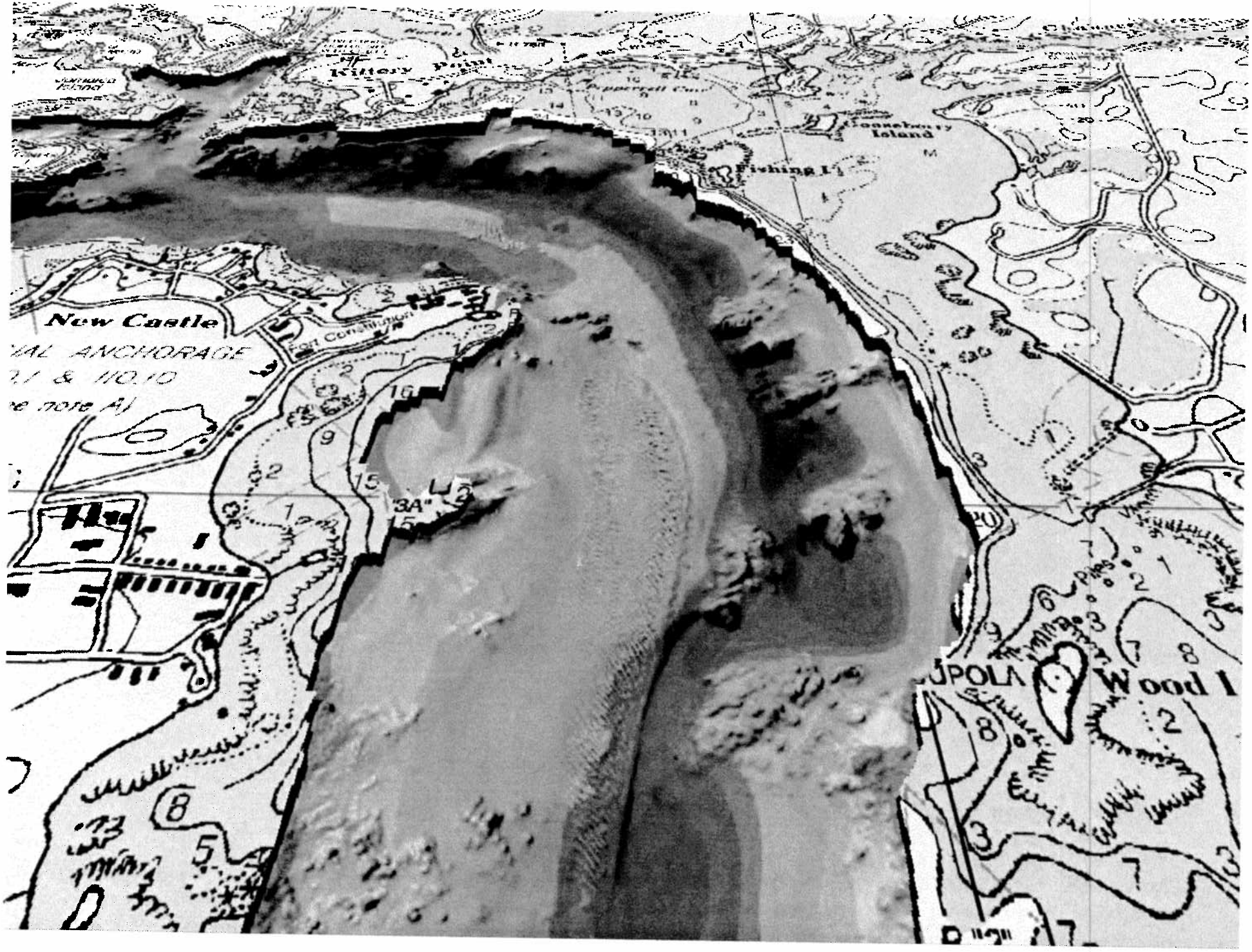
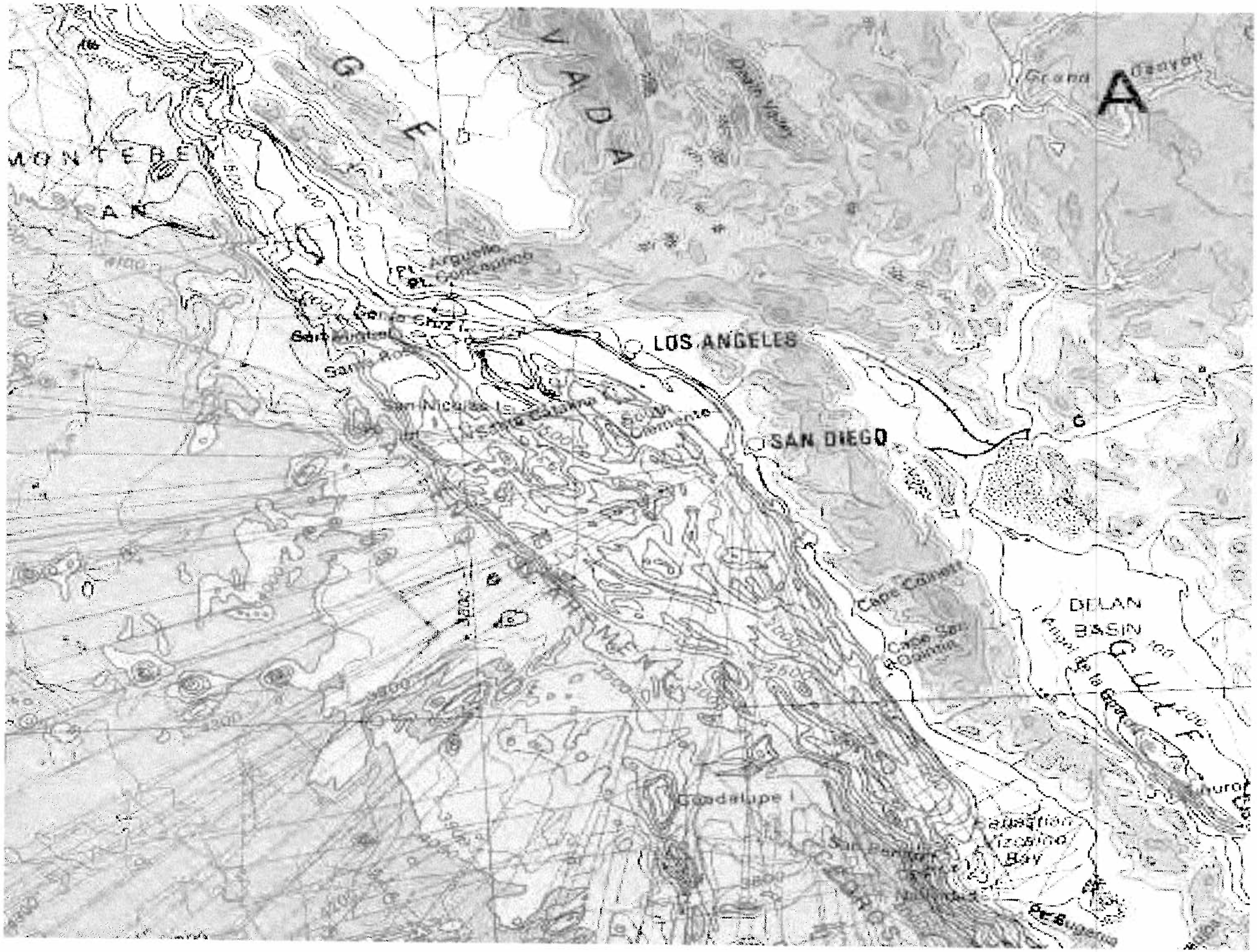
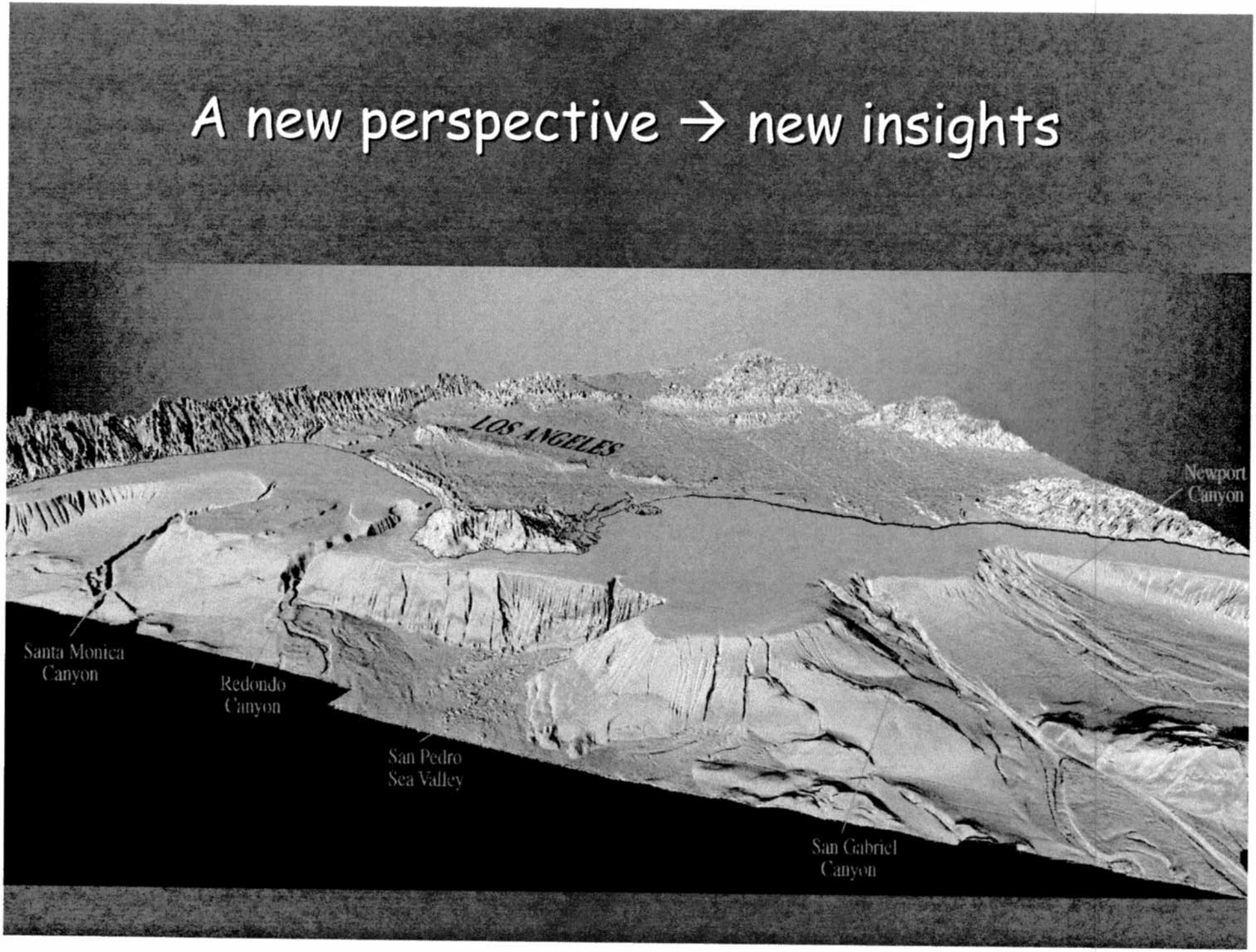
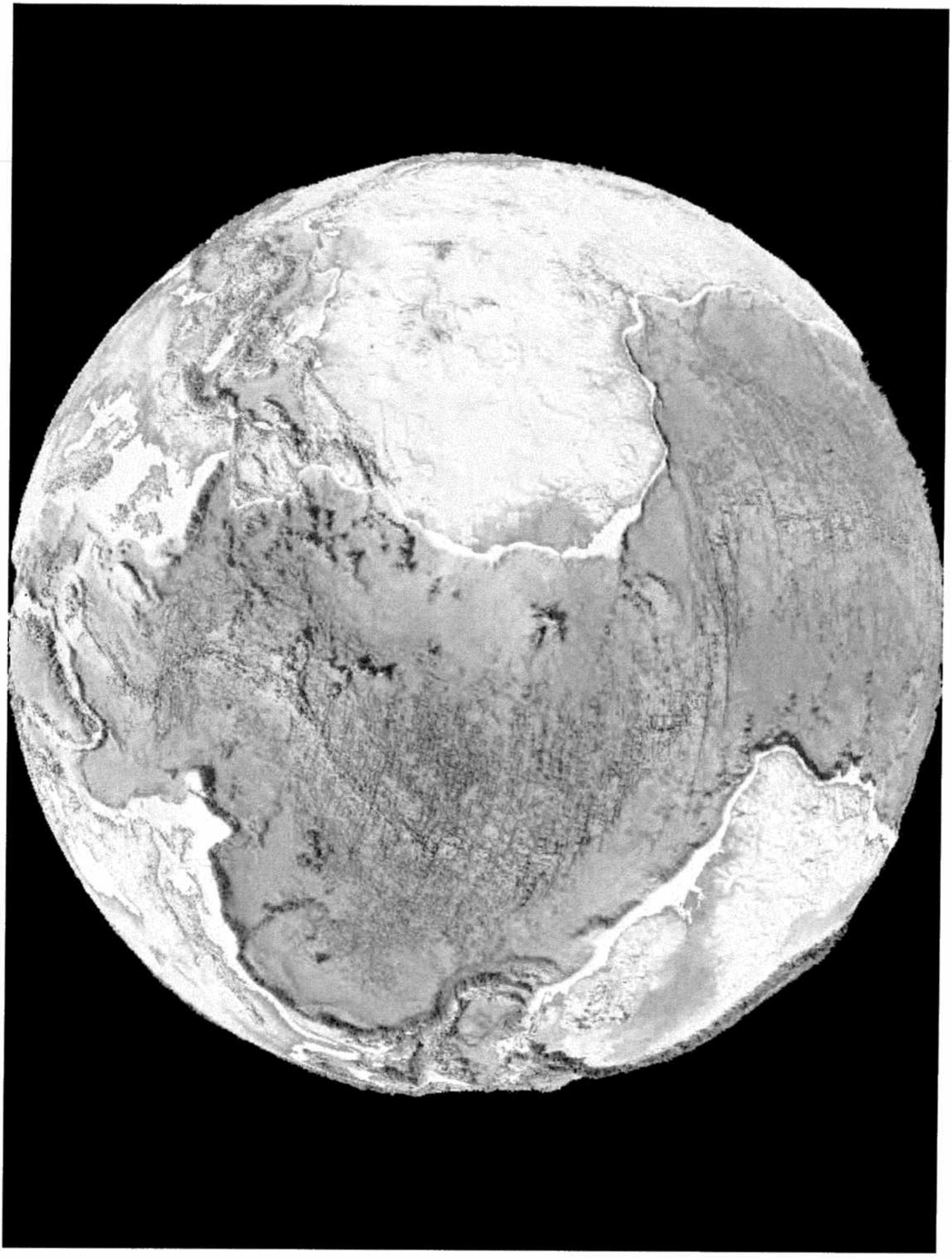
Wood I
Rky


New Castle
Fishing I.
Goosebury Island
3A"

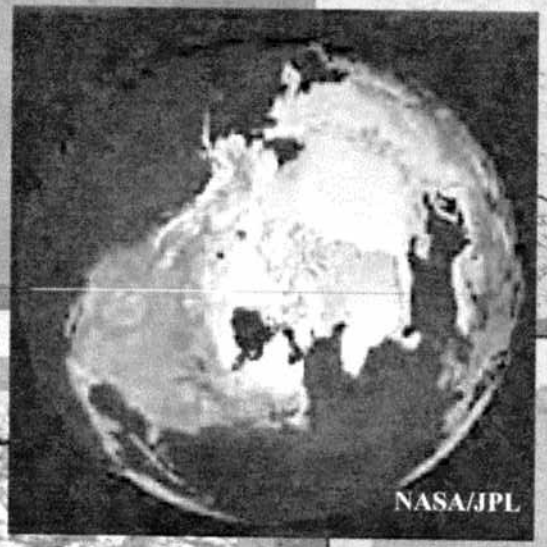

LOS ANGELES
SAN DIEGO
Guadalupe I
Cape Colnett
Cape San Quintin
DELAN
BASIN

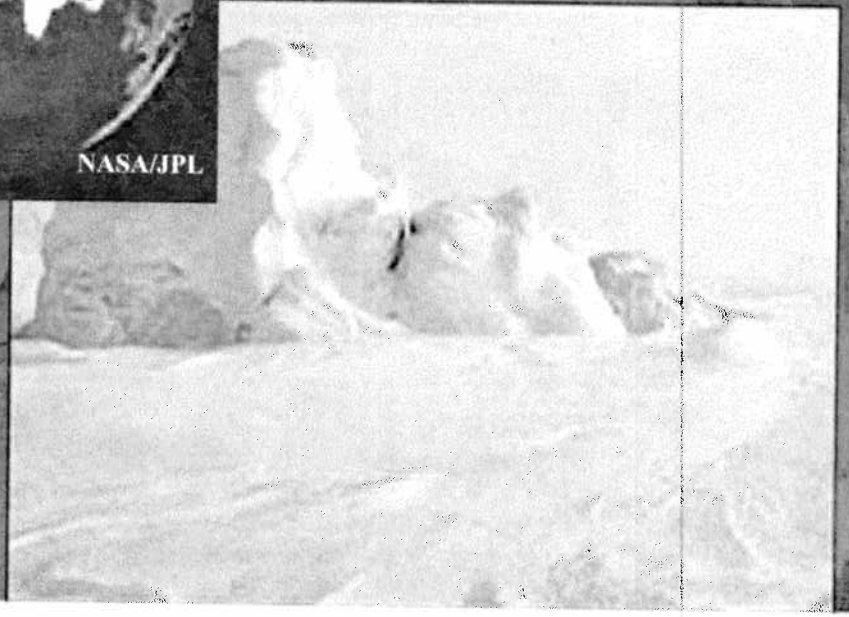
A new perspective → new insights





It's Not So Simple in the Arctic

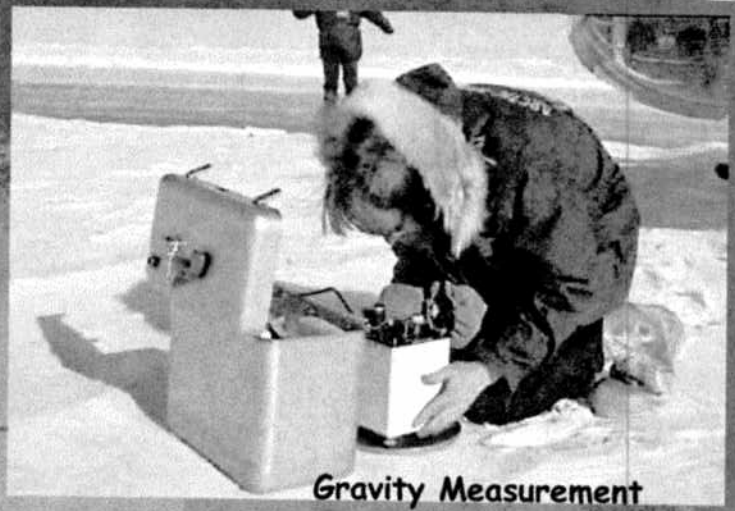


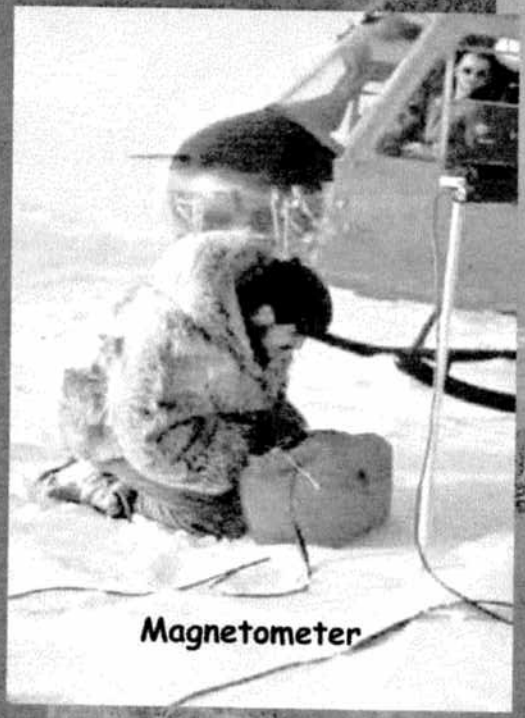


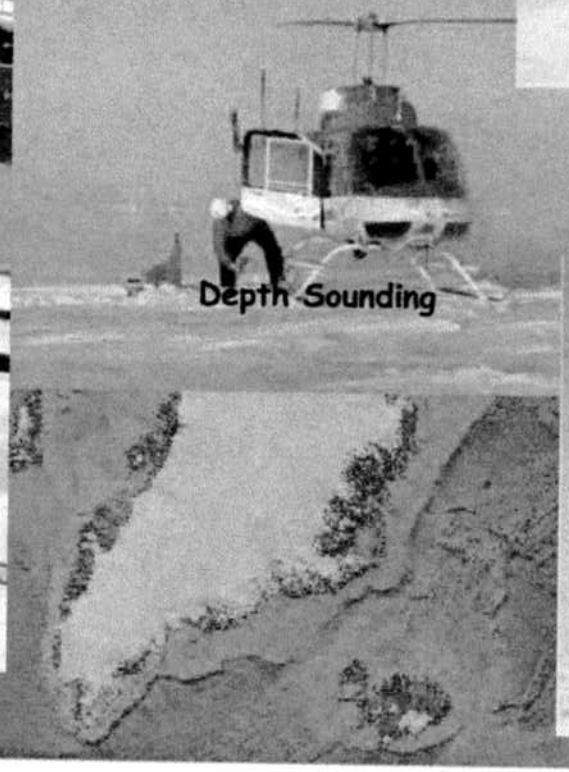
Fletcher's Ice Island (T-3)

1962 - 1974

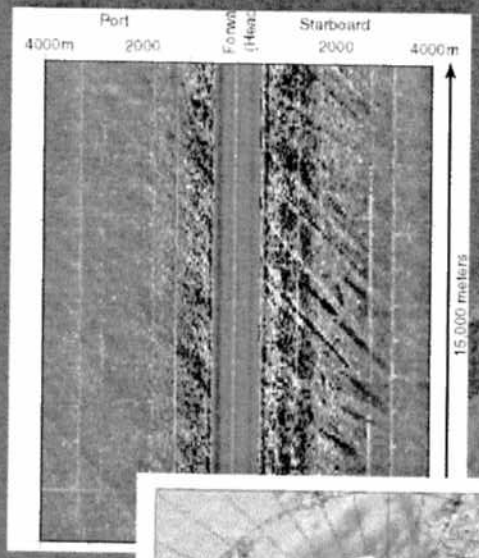
Airborne Measurements and Point Soundings

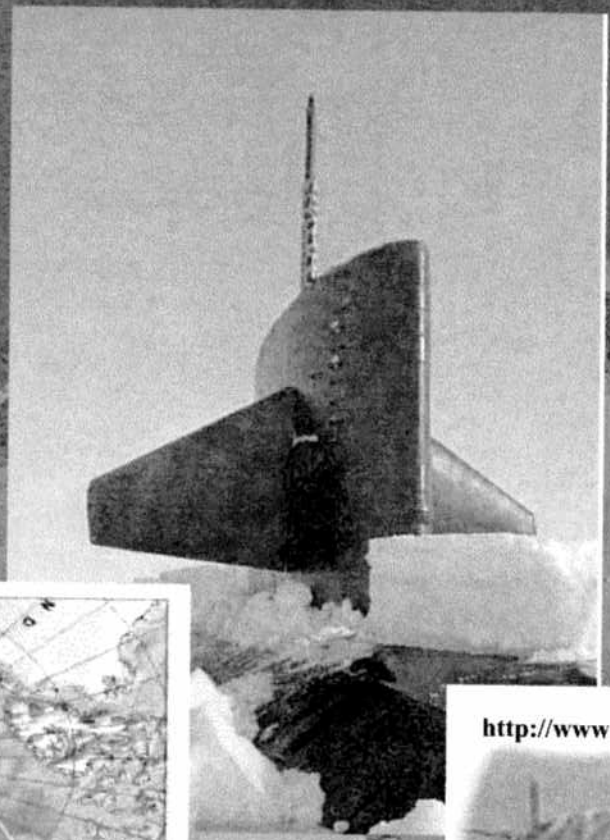

Gravity Measurement

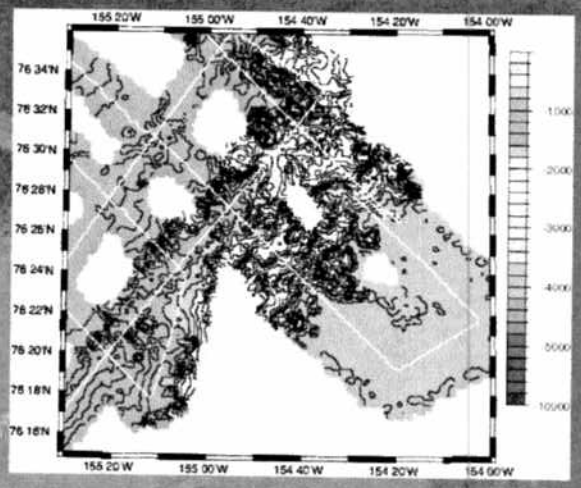

Magnetometer

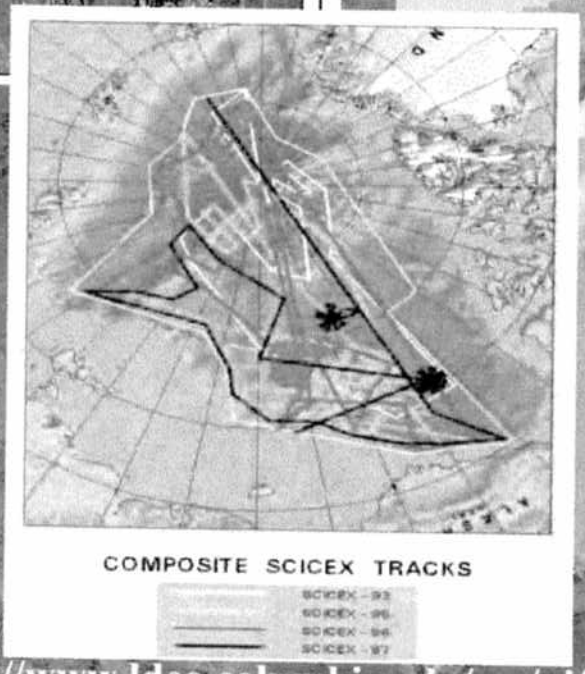

Depth Sounding

Data from Nuclear Submarines

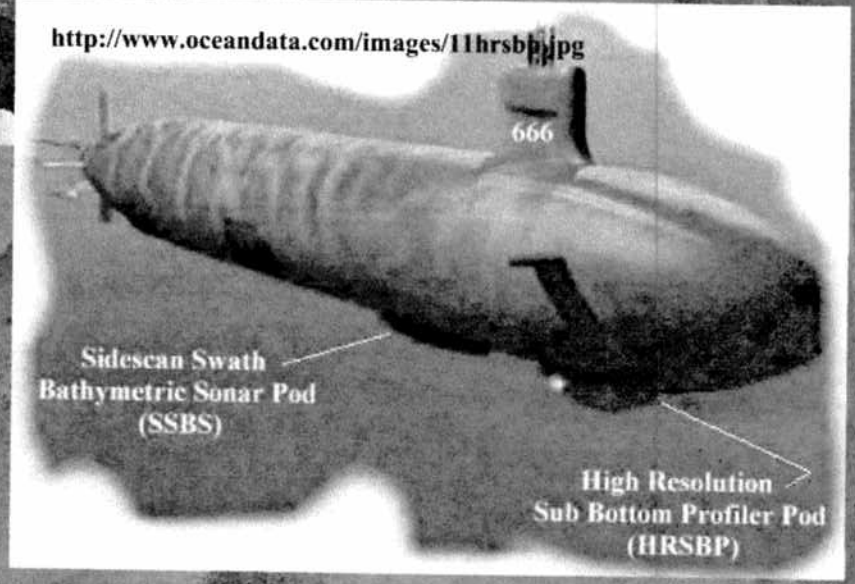






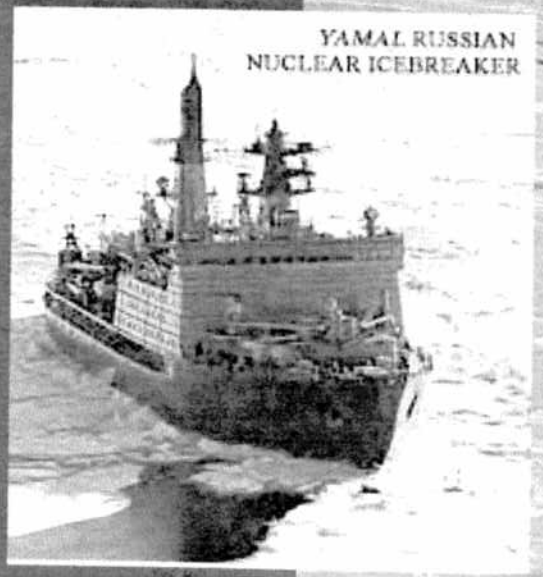


http://www.oceandata.com/images/11hrsbp.jpg

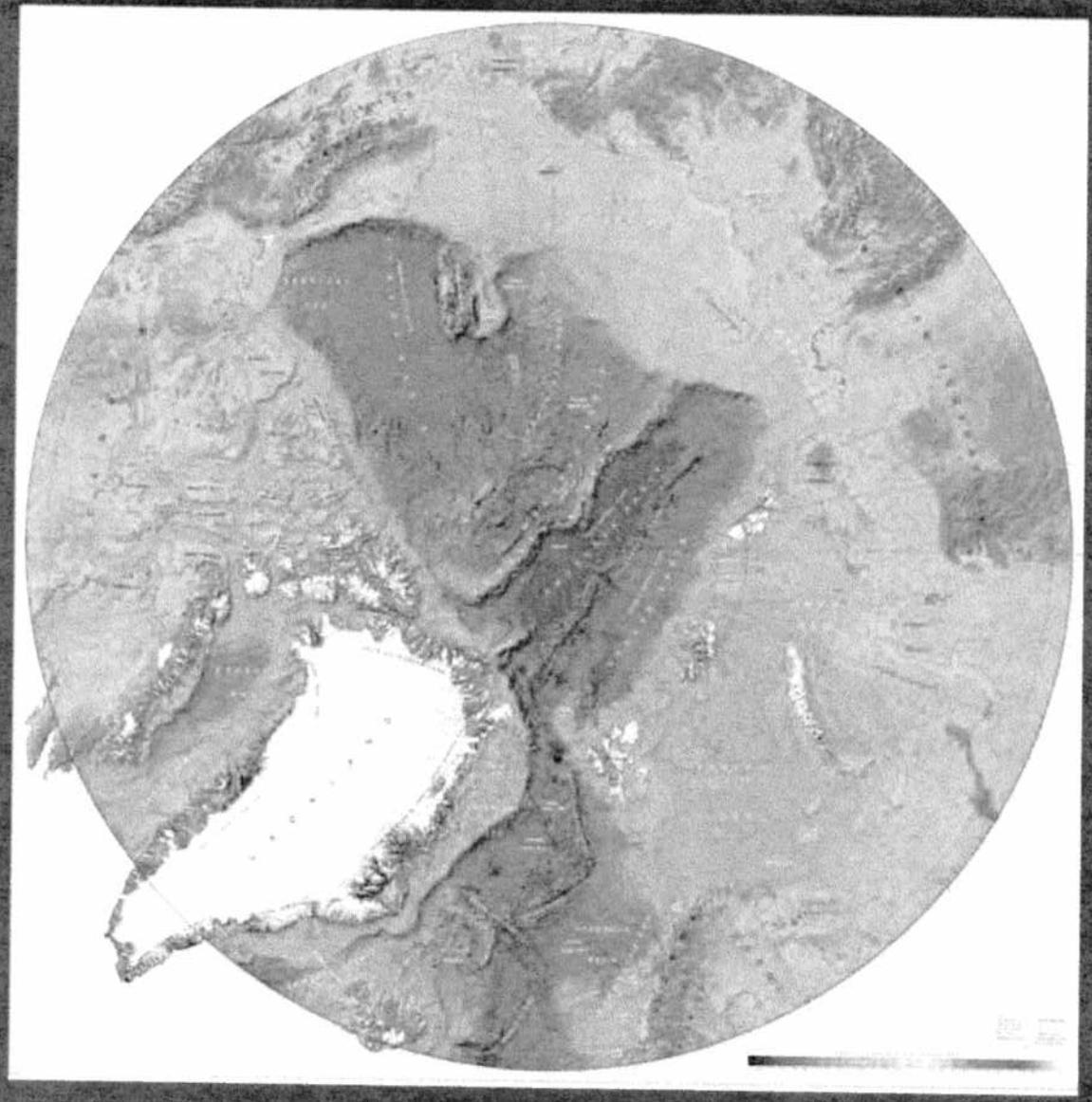


http://www.ldeo.columbia.edu/res/pi/SCICEX/

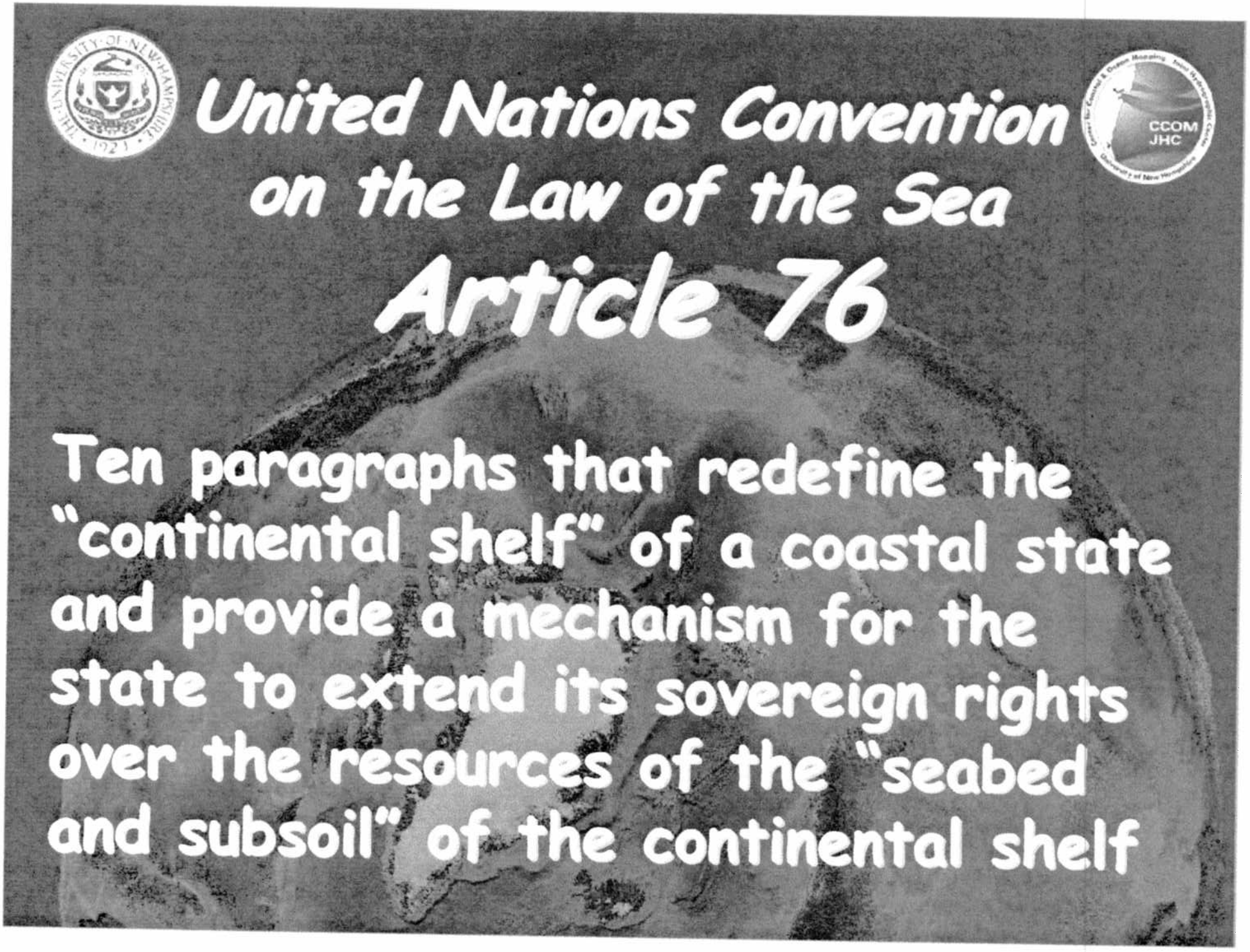
Icebreaker Deployed Seismic and Bathy



Bathymetric Compilation



IBCAO (2002)


United Nations Convention
on the Law of the Sea
Article 76
CCOM
JHC
Ten paragraphs that redefine the
"continental shelf" of a coastal state
and provide a mechanism for the
state to extend its sovereign rights
over the resources of the "seabed
and subsoil" of the continental shelf

UNCLOS Article 76

The Process

- A coastal state is entitled to sovereign rights over the resources of the seabed and subsoil of "submerged extensions of the continental margin" beyond their current Exclusive Economic Zone (EEZ)

- Demonstrate a "natural prolongation" of a coastal state's territorial landmass and apply the "test of appurtenance"

  typically broad continental shelf and/or

  thick sedimentary wedge

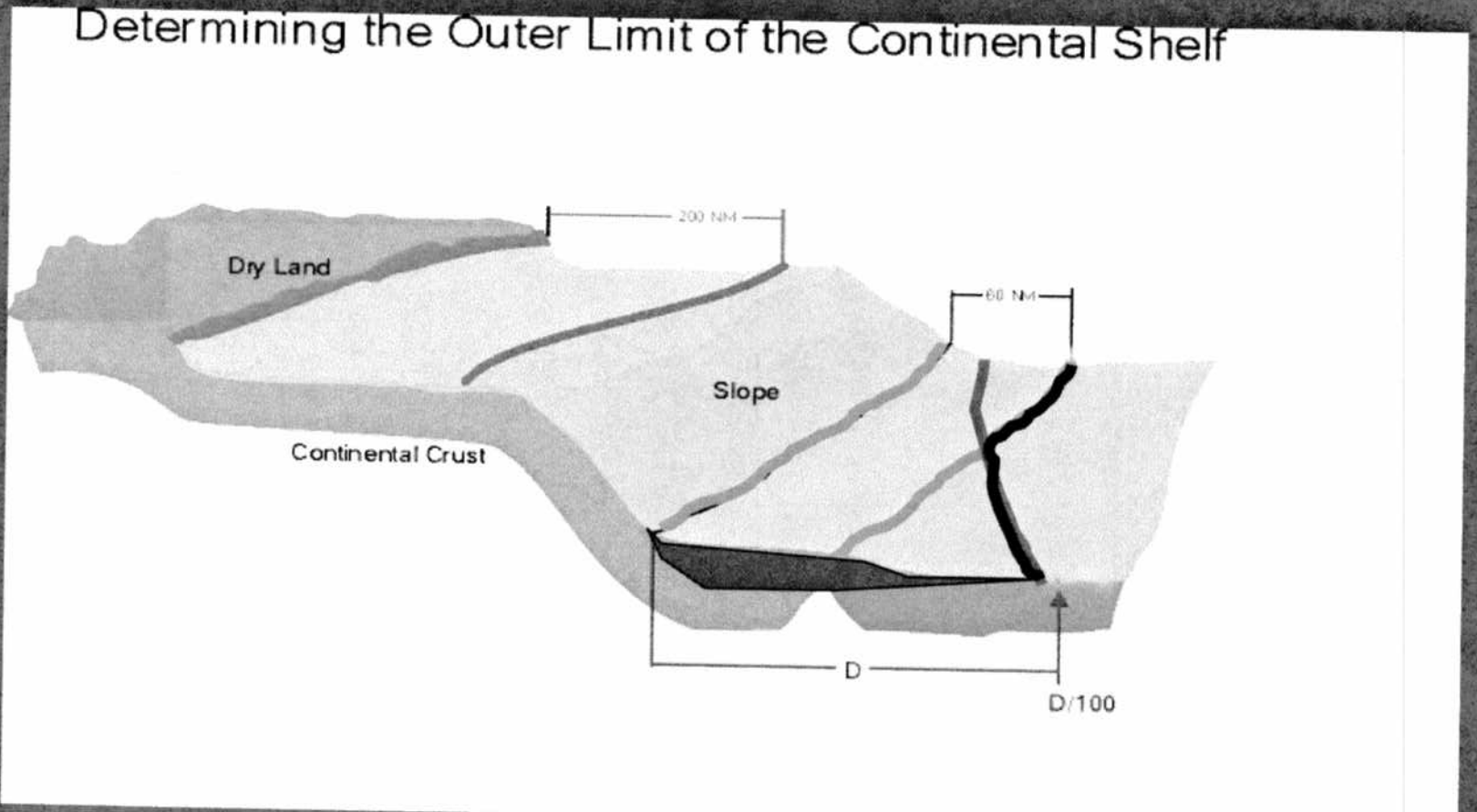
Data Required

- Once the natural prolongation is established the extended continental shelf beyond the existing 200 nm EEZ is determined by a set of formulae and limit lines defined from the:
  - depth and shape of the seafloor (FOS and 2500m contour)
  - the thickness of the underlying sediments (1% line)
  - distances from the territorial sea baselines (350 nm line)

Formula Lines:

Foot of Slope + 60 nmi *- bathy*

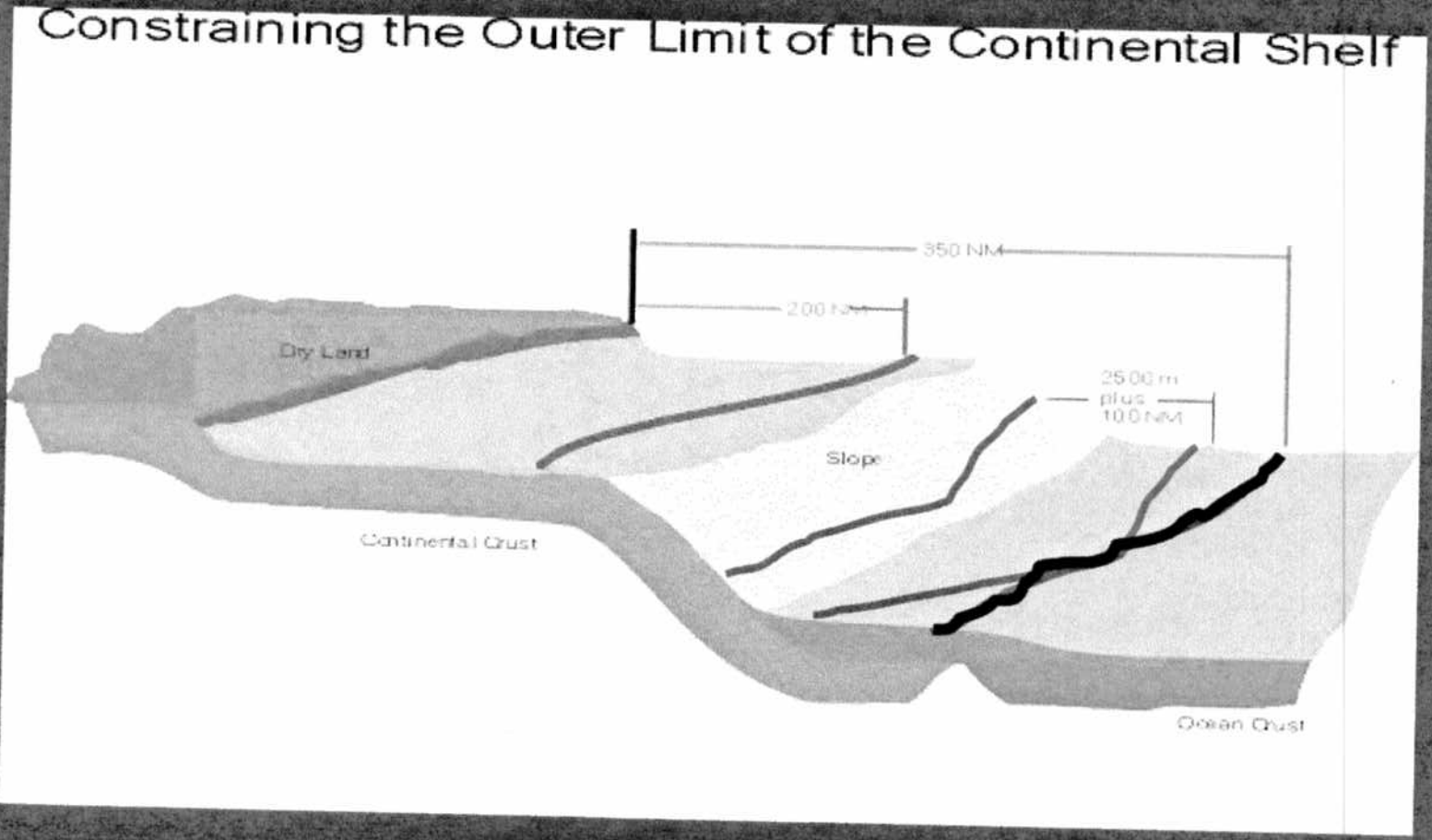
Gardiner line ***- sediment thickness less than 1% of distance back to FOS*** *- seismic and bathy*



Cutoff Lines:

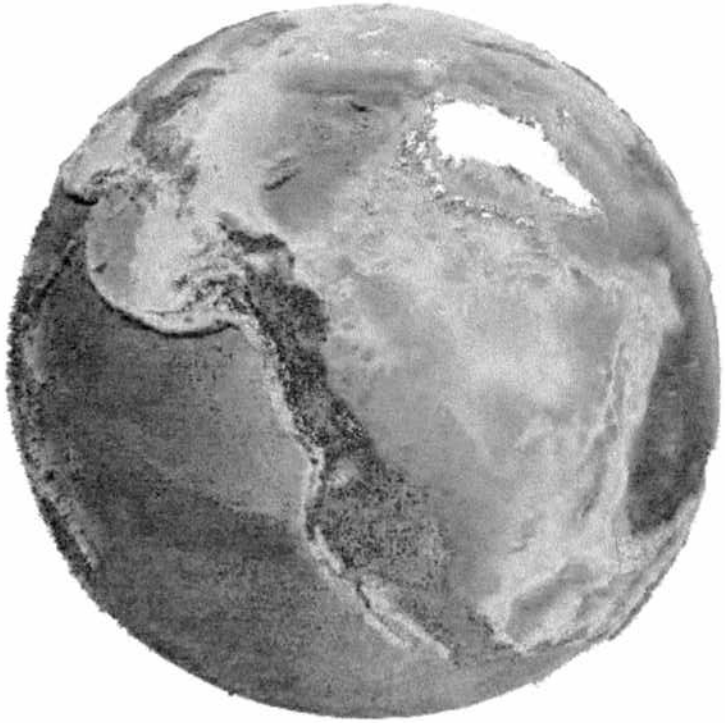
2500 m contour+100 nmi - *bathy*

350 nmi from baseline - *distance*



The Compilation and Analysis of Data Relevant to a U.S. Claim Under United Nations Law of the Sea Article 76: A Preliminary Report

http://ccom.unh.edu/unclos

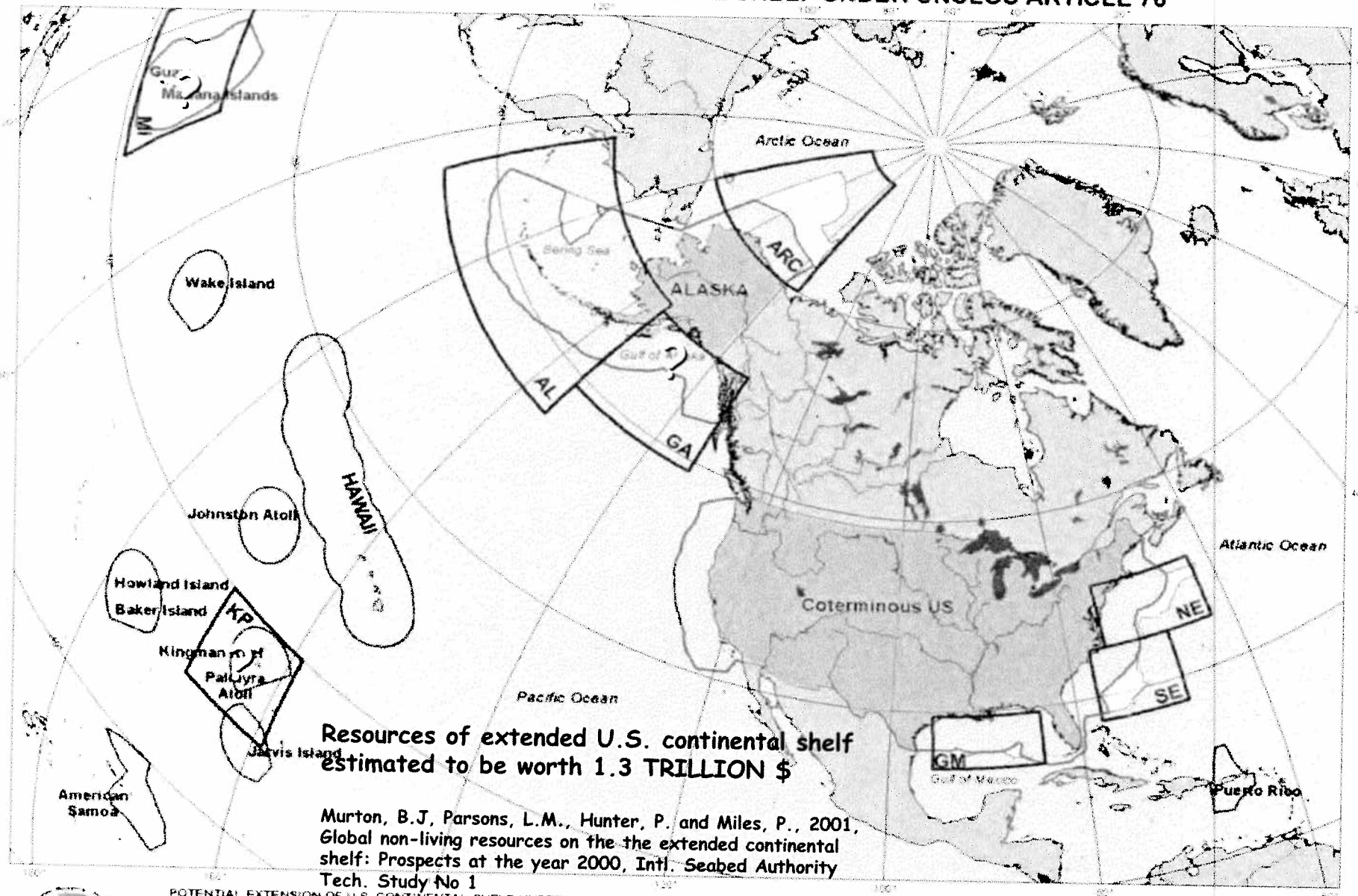


Center for Coastal and Ocean Mapping/Joint Hydrographic Center
University of New Hampshire

Durham, N.H.
May, 2002

Larry Mayer, Martin Jakobsson and Andrew Armstrong

POTENTIAL EXTENSION OF U.S. CONTINENTAL SHELF UNDER UNCLOS ARTICLE 76



Resources of extended U.S. continental shelf estimated to be worth 1.3 TRILLION $

Murton, B.J, Parsons, L.M., Hunter, P. and Miles, P., 2001, Global non-living resources on the the extended continental shelf: Prospects at the year 2000, Intl. Seabed Authority Tech. Study No 1

POTENTIAL EXTENSION OF U.S. CONTINENTAL SHELF UNDER UNCLOS ARTICLE 76

CCOM JHC

Map compiled by:
Martin Jakobsson,
Andy Armstrong and Larry Mayer
Center for Coastal and Ocean Mapping
Joint Hydrographic Center
University of New Hampshire, USA