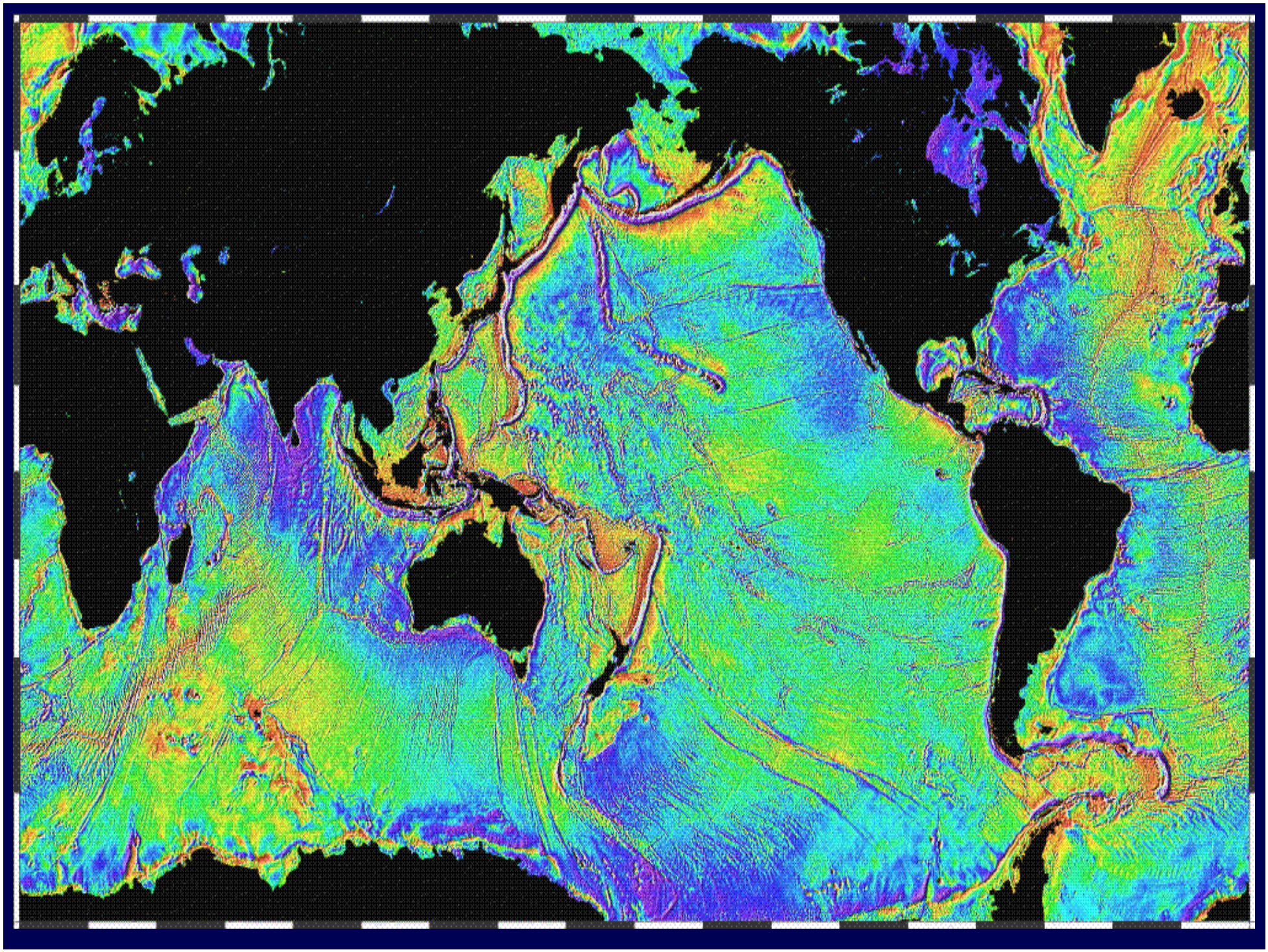

Seafloor Mapping & GIS
for the
Fagatele Bay National
Marine Sanctuary
Dawn J. Wright
Department of Geosciences
Oregon State University, USA
American Samoa Public Library, May 10, 2001
Kip Evans



From the Entire Globe to a Single Volcano

- **Only 5% of global seafloor charted with ships - we need 125 more years!**
- **Deepwater systems detects seafloor features the size of this room**
  - over depths of several miles….
- **Shallow water systems on a cm-scale**

Multibeam Echosounding

- **1970's - revolution in bathymetric mapping with "multibeam" systems**
- **multiple, focused sound beams**
  - "narrow-beam" or "multibeam" bathymetry
  - sound beam stays narrow and focused all the way to the bottom
  - depths much more precise

Multibeam Echosounding

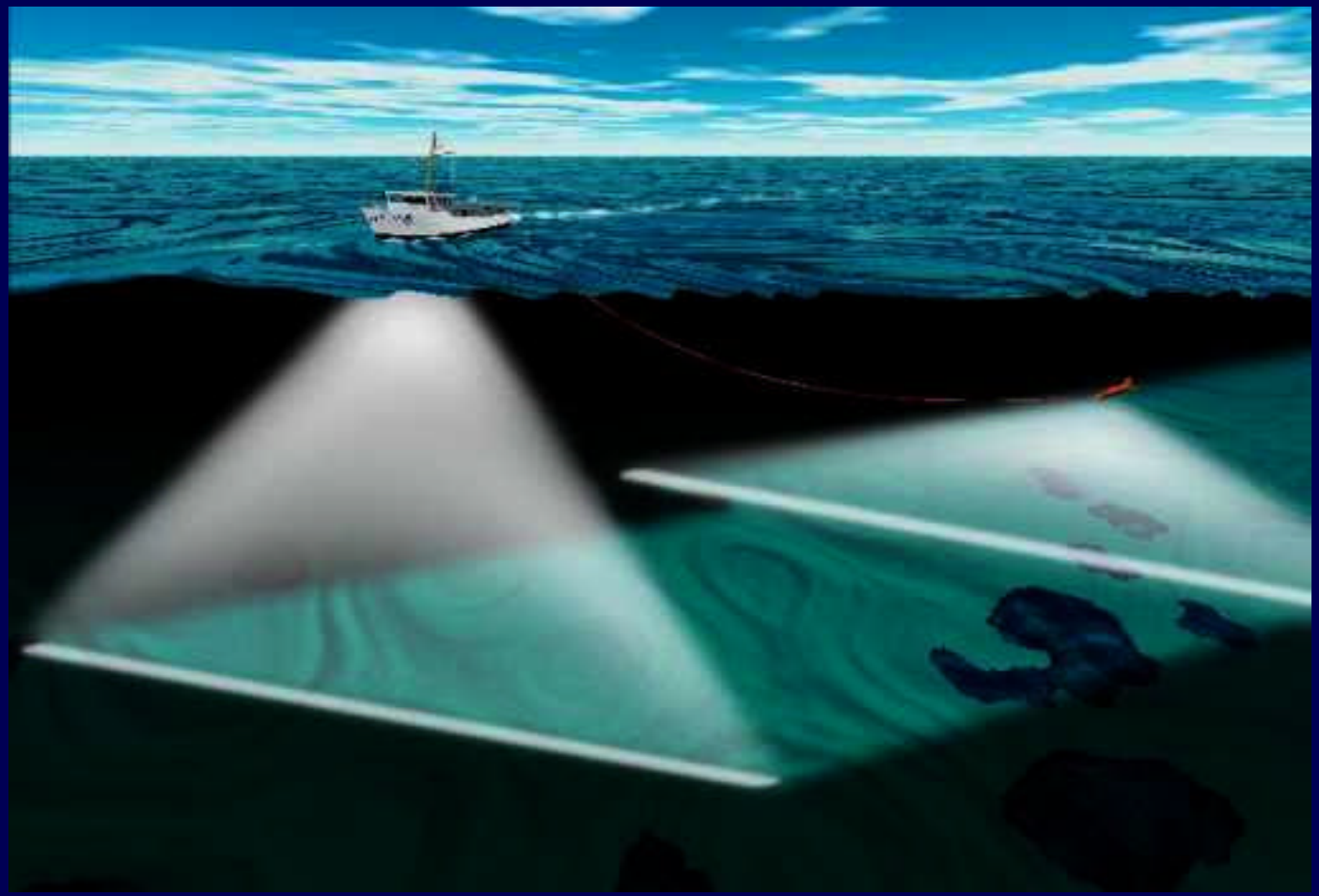
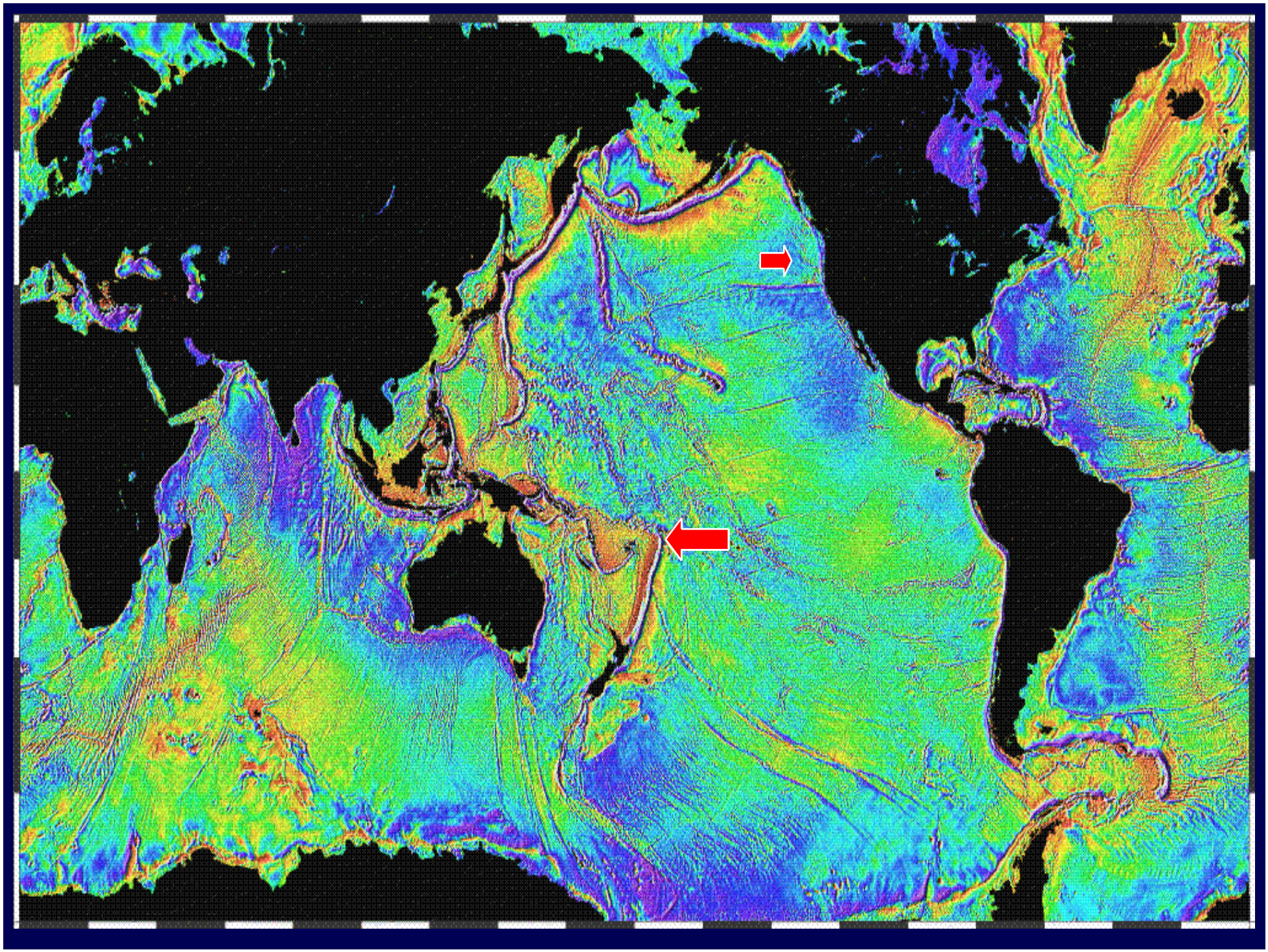
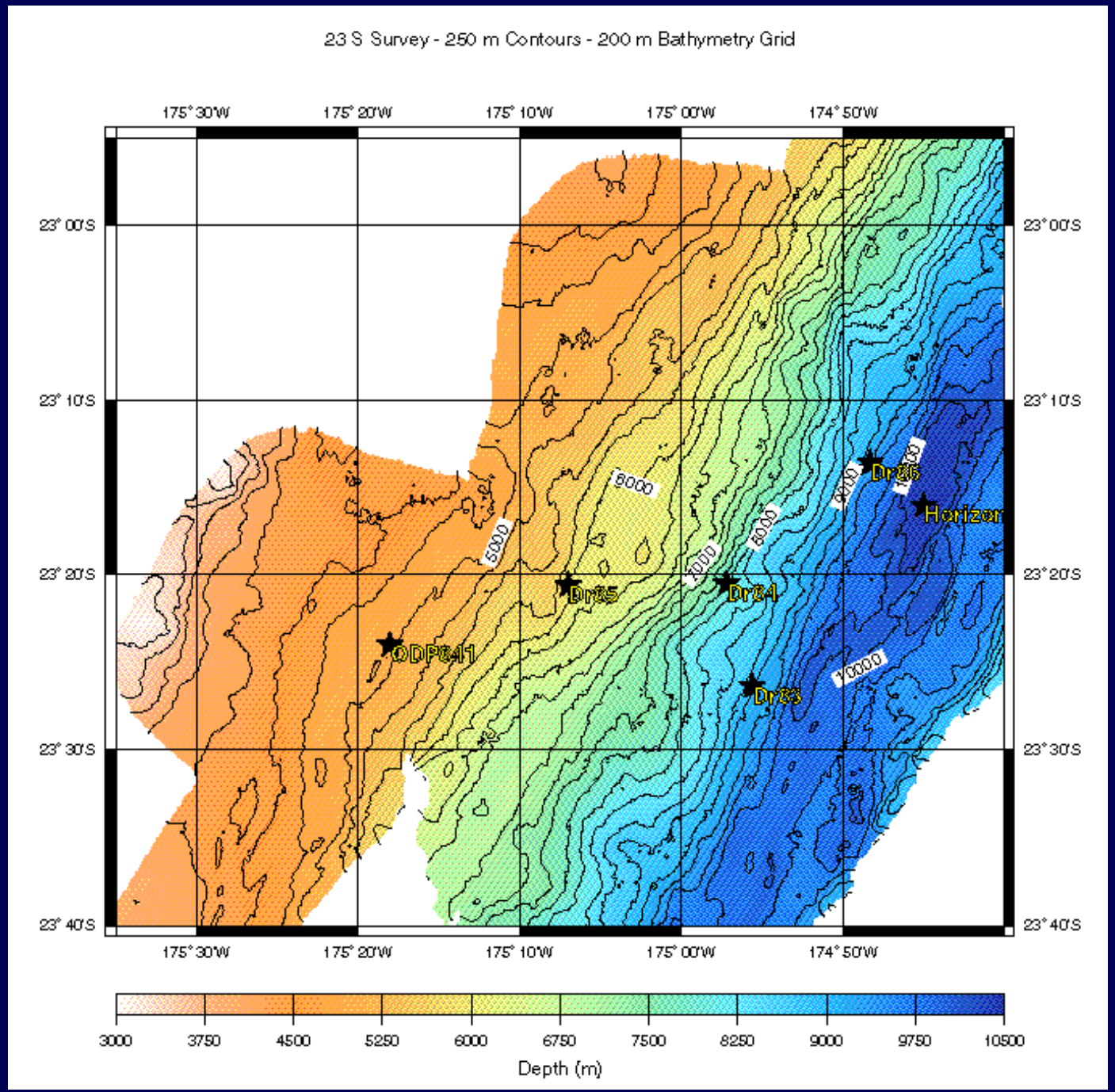


Image courtesy of NOAA




23 S Survey - 250 m Contours - 200 m Bathymetry Grid
175° 30'W
175° 20'W
175° 10'W
175° 00'W
174° 50'W
23° 00'S
23° 10'S
23° 20'S
23° 30'S
23° 40'S
5000
6000
7000
8000
9000
10000
Dr#6
Horizon
Dr#5
Dr#4
ODP#1
Dr#3
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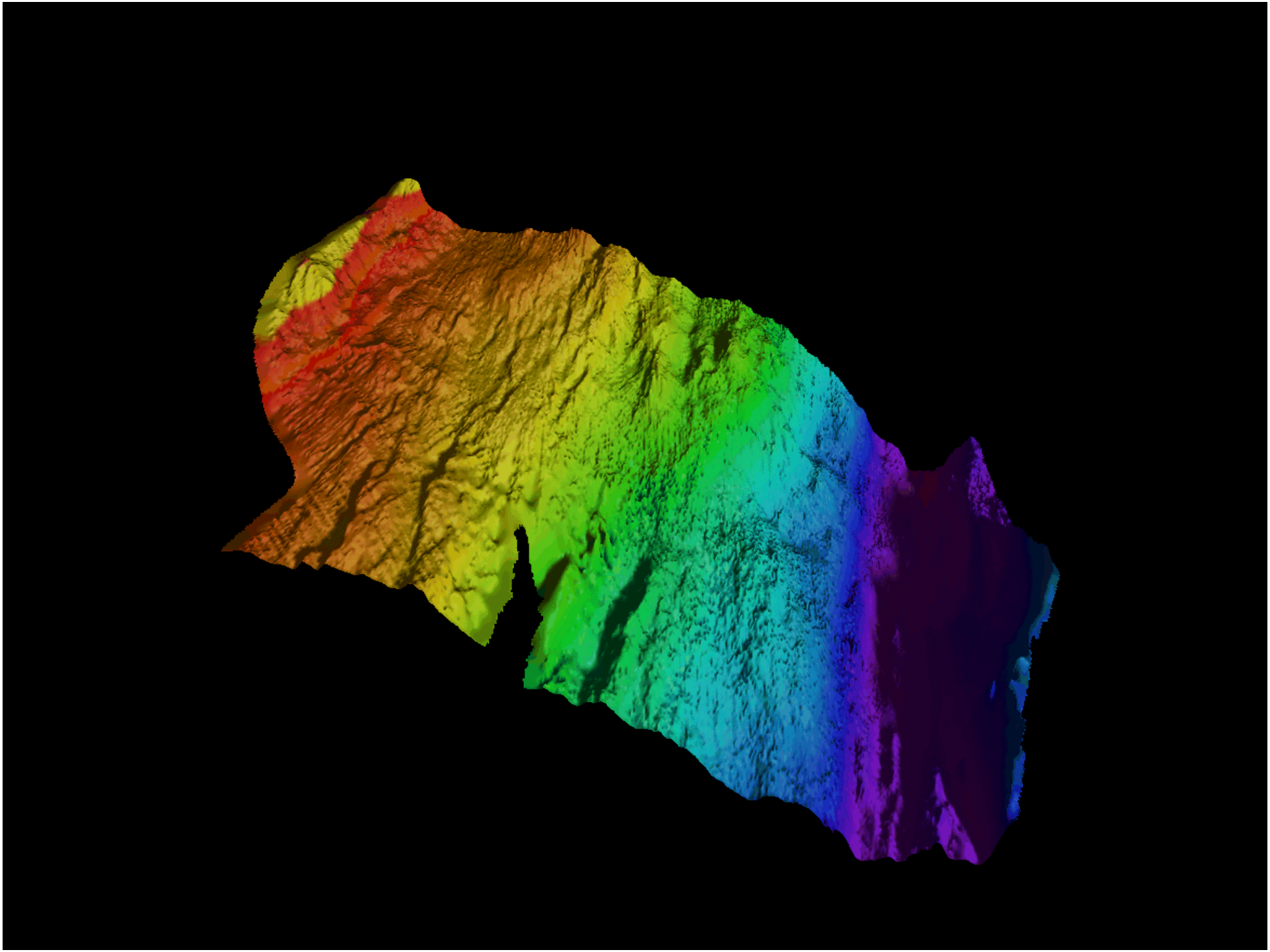
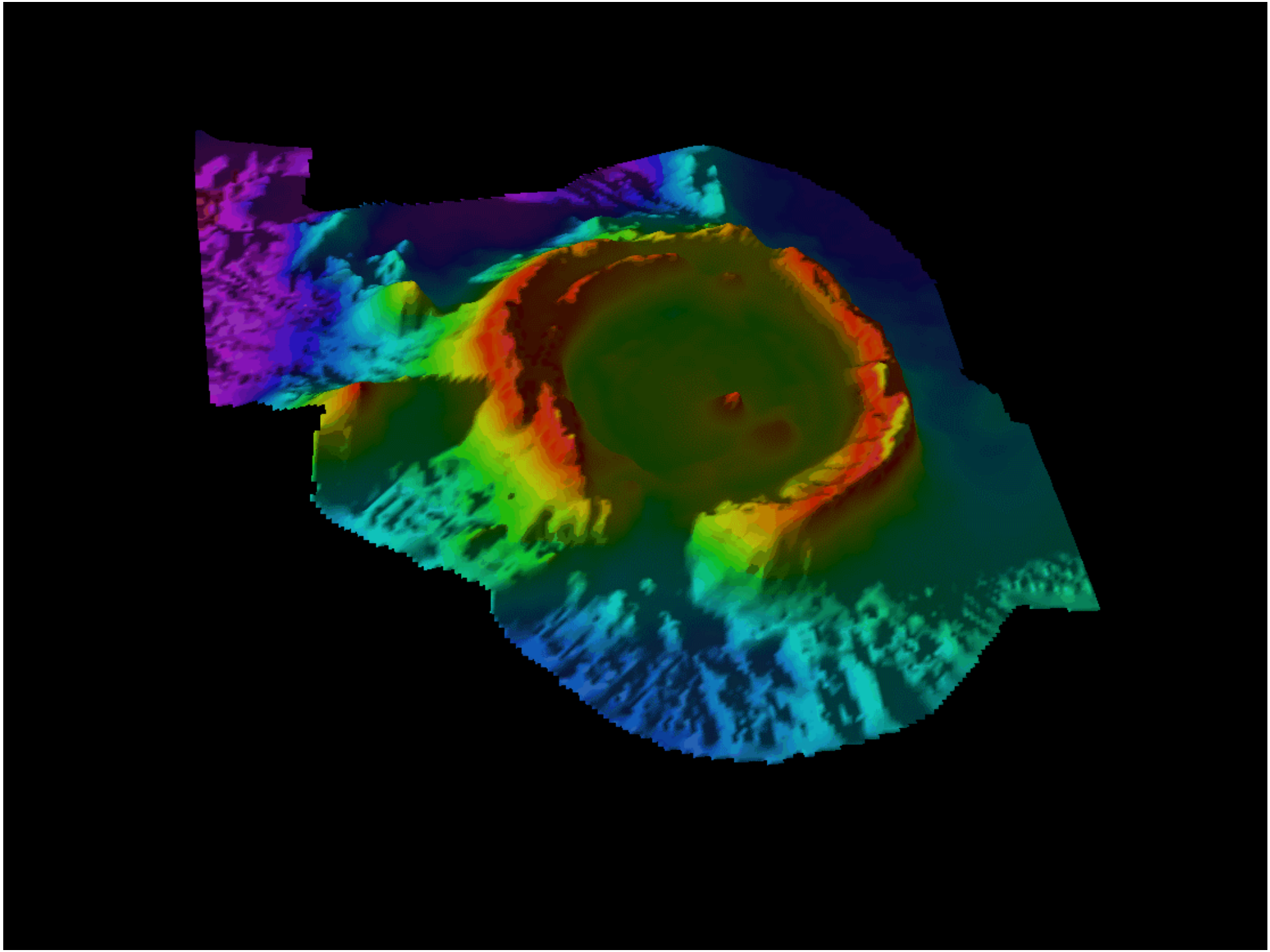
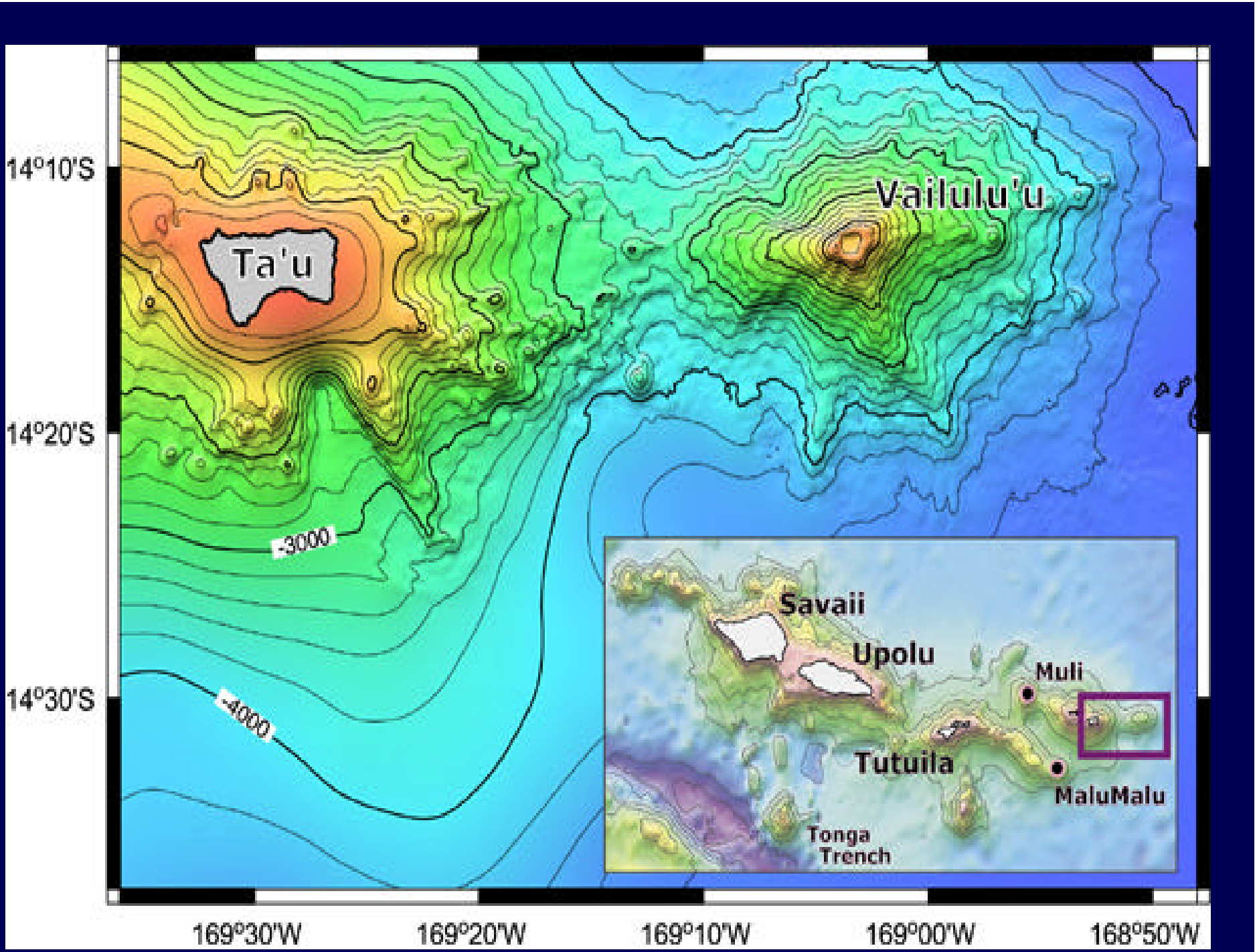
9000
9750
10500
Depth (m)






14°10'S
14°20'S
14°30'S
169°30'W
169°20'W
169°10'W
169°00'W
168°50'W
Ta'u
Vailulu'u
-3000
-4000
Savaii
Upolu
Muli
Tutuila
MaluMalu
Tonga
Trench

Shallow Multibeam

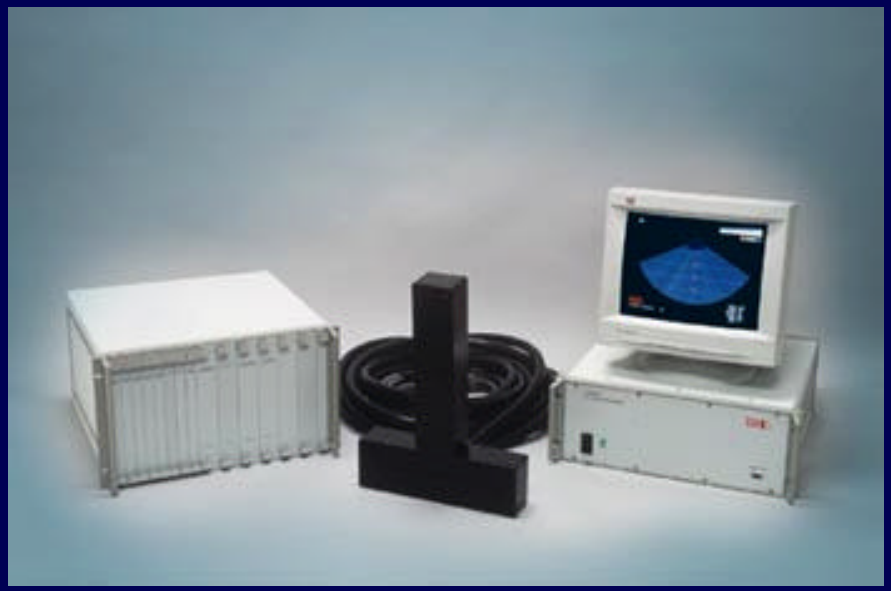
- Kongsberg-Simrad EM-3000
- Fans out 121 beams at 130 deg.
- Swaths 3-4 times water depth
- Depths in 3-150 m range at survey speeds of 3-12 knots
- Cm-resolution w/ dGPS

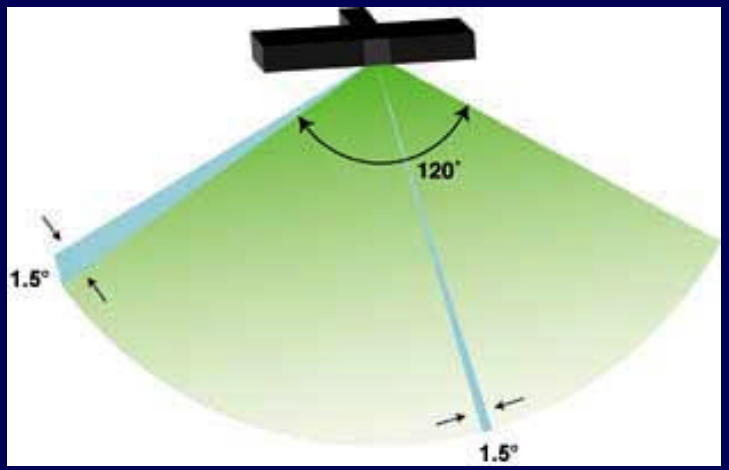
COLLEGE OF MARINE SCIENCE
UNIVERSITY OF SOUTH FLORIDA

USF

Center for Coastal Ocean Mapping
Department of Marine Science
University of South Florida

Shallow Multibeam cont.



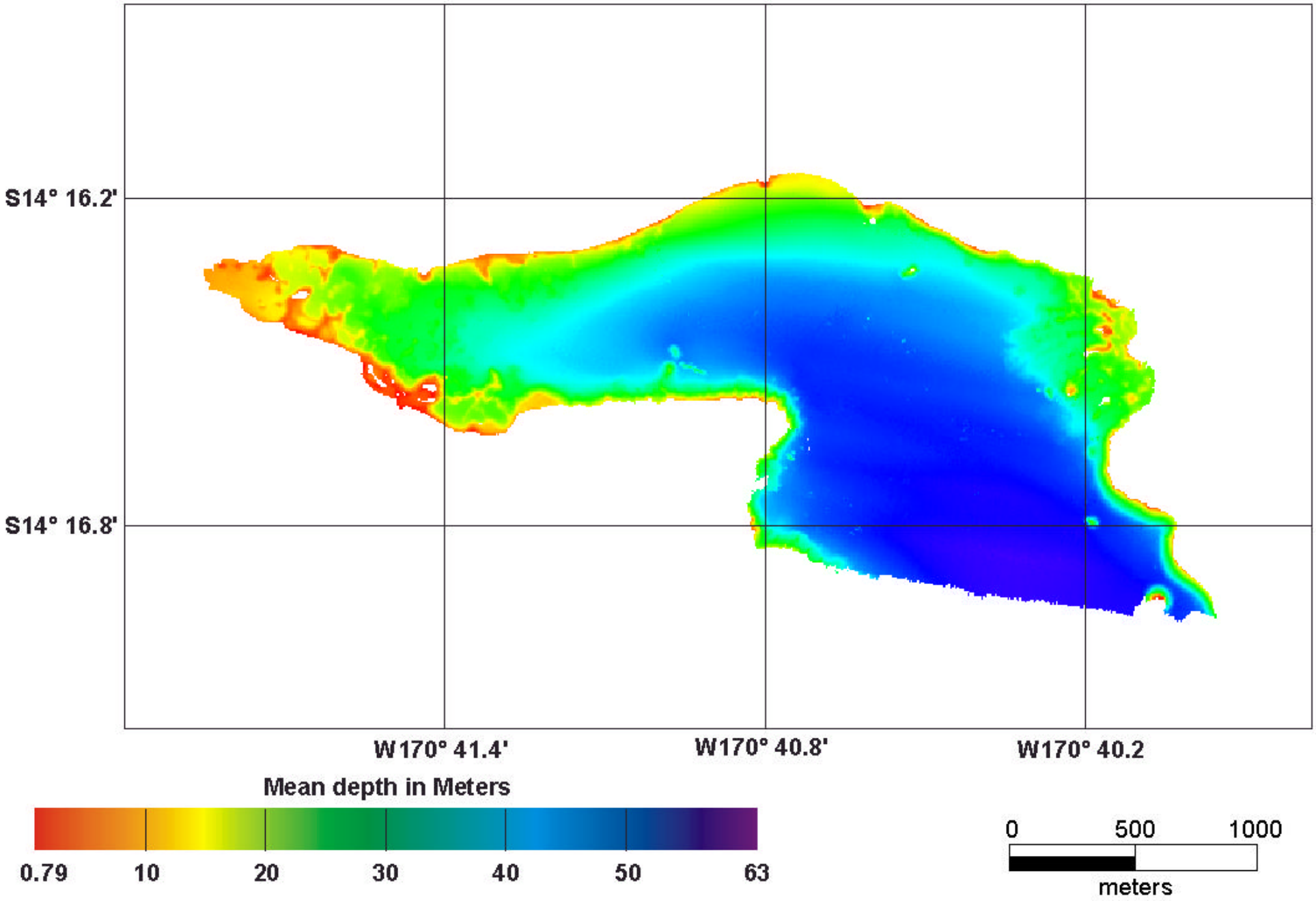


Images courtesy of Reson.com

* NOT FOR NAVIGATION

Pago Pago Harbor, American Samoa

processed at 1 meter per pixel



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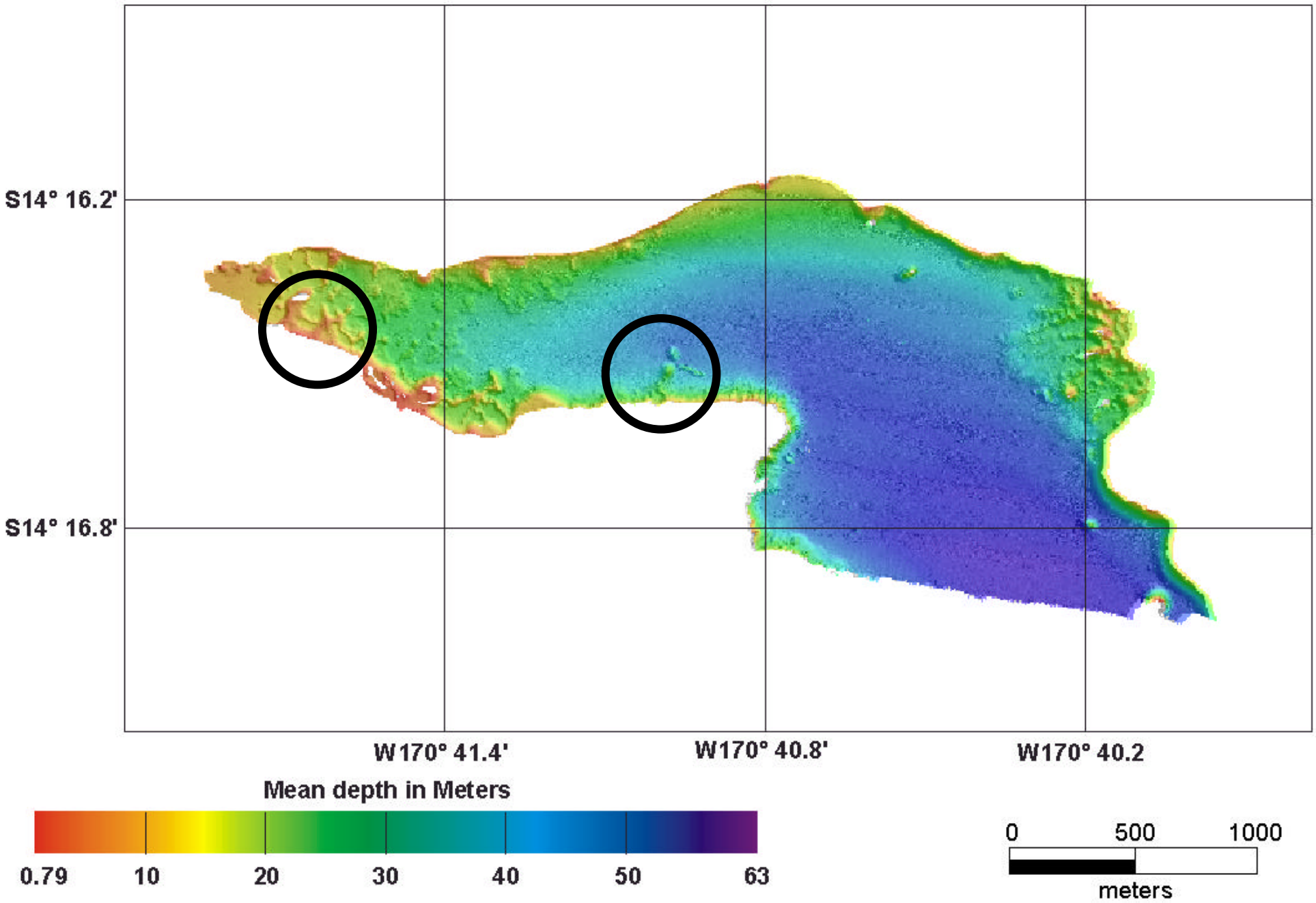

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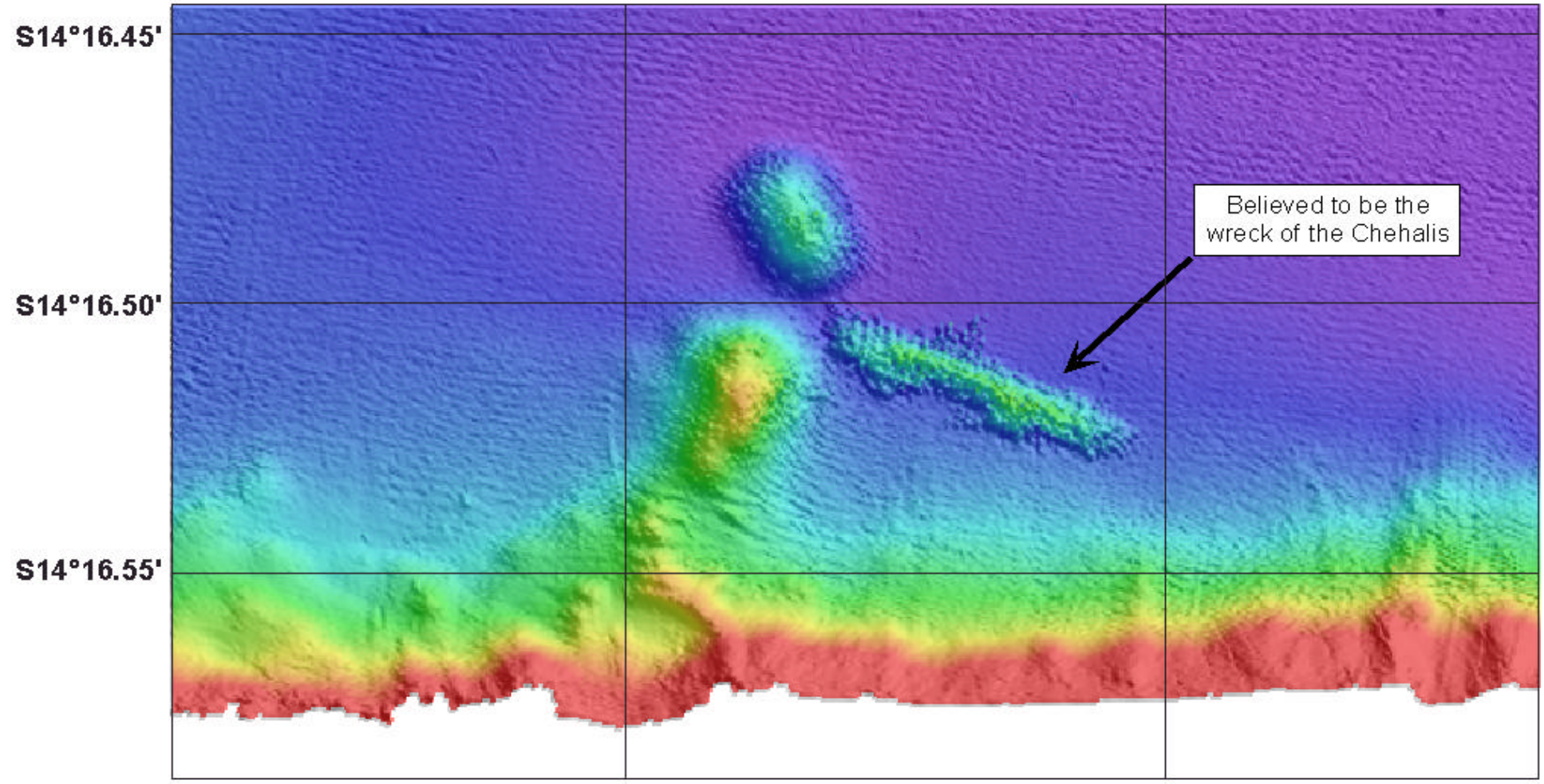
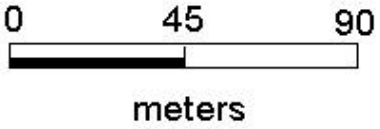
Pago Pago Harbor, American Samoa

processed at 1 m per pixel



Mean depth in Meters



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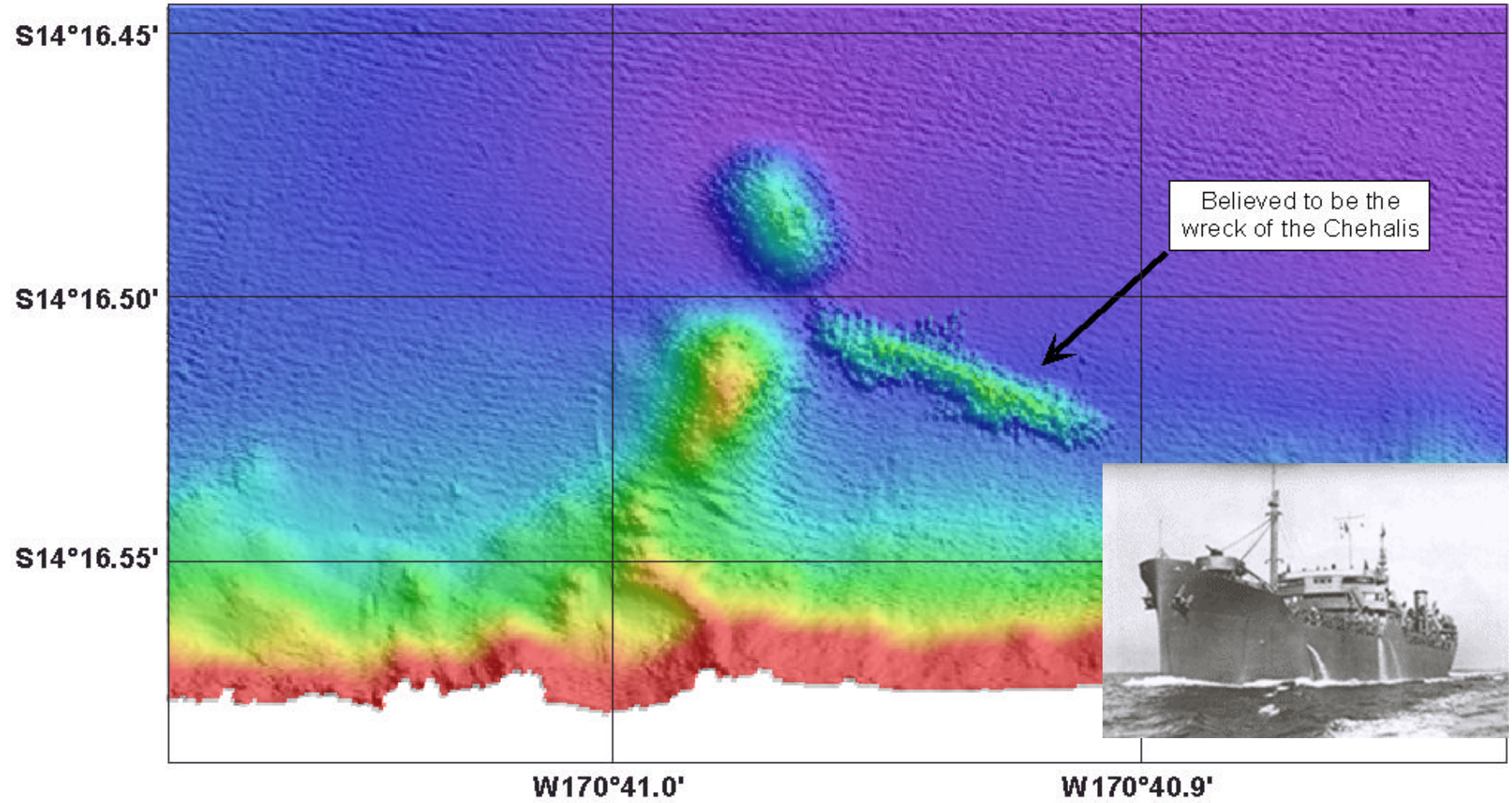
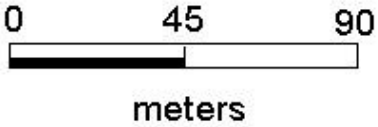
Pago Pago Harbor, American Samoa

processed at 1 m per pixel



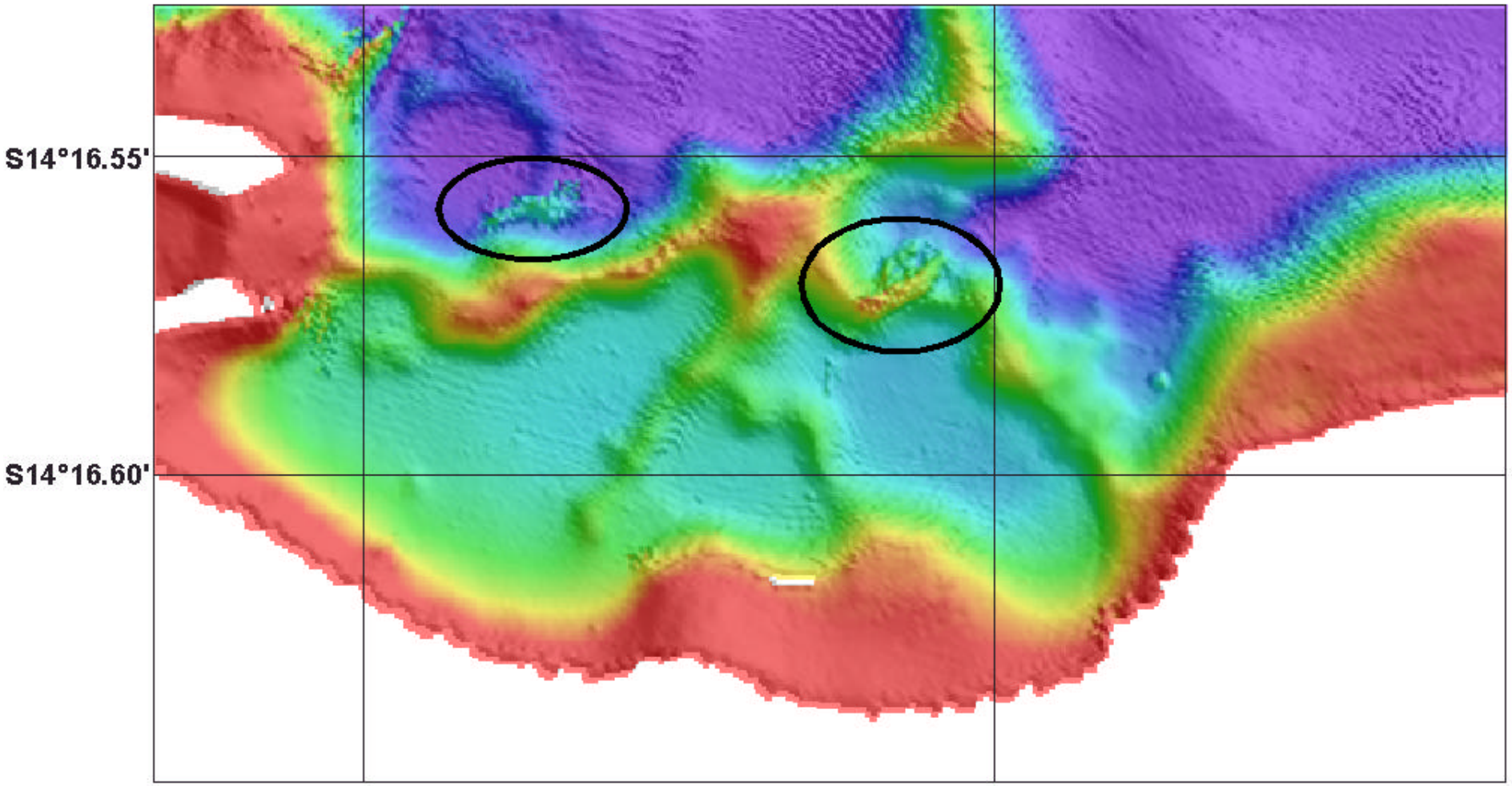
Mean depth in Meters



* NOT FOR NAVIGATION

Pago Pago Harbor, American Samoa, Two possible Wrecks

processed at 1 meter per pixel



Mean depth in Meters

12 15 20 25 30

0 50 100

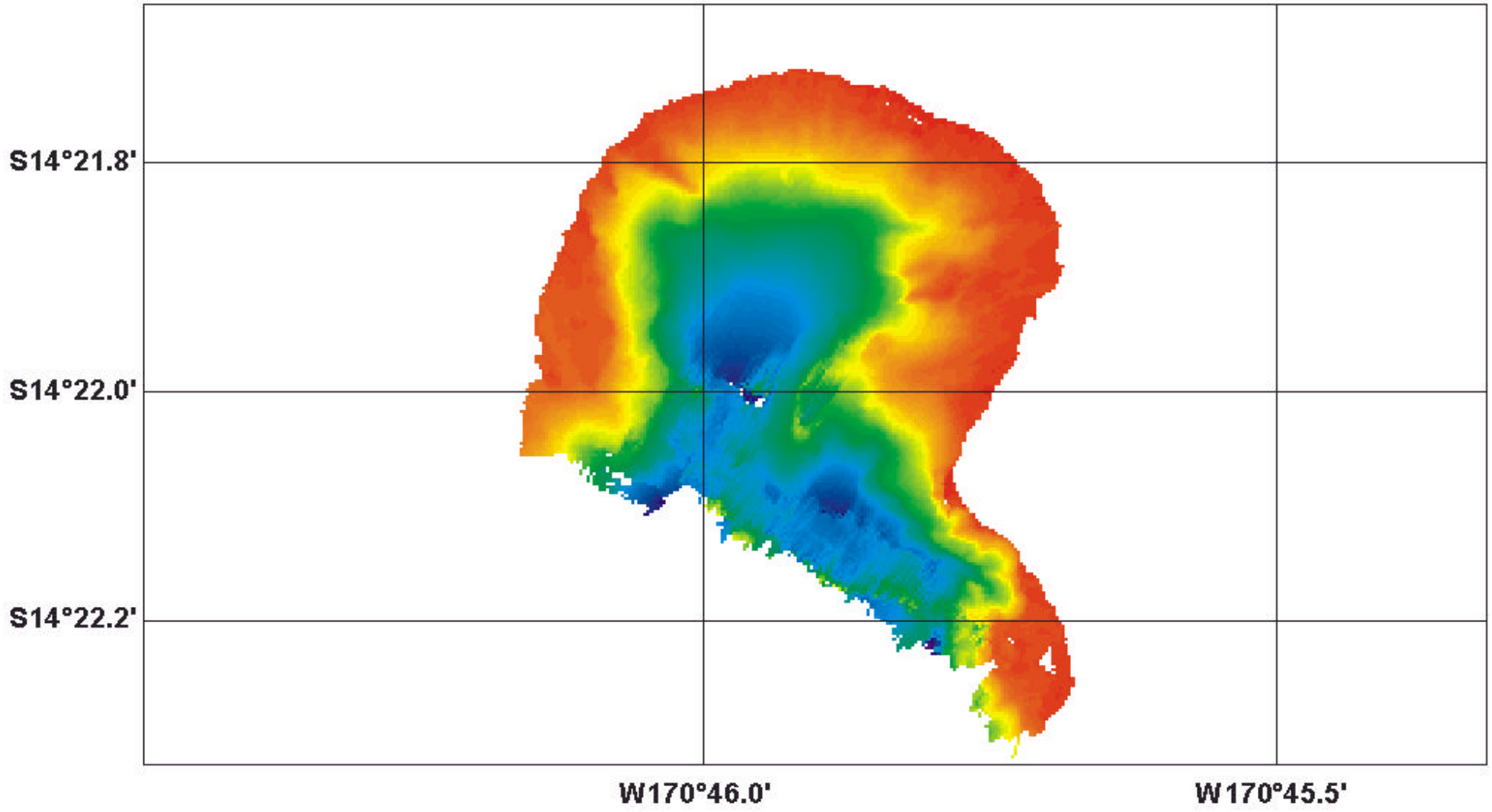
meters

FBNMS: Some Major Issues

- **Sanctuary largely unexplored below depths of ~30-60 m**
  - no comprehensive documentation of the plants, animals, and submarine topography**.**
- **Virtually nothing known of shelf-edge (50-120 m deep) coral reef habitats *throughout the world***
- **Implications of geometry/size of a bay? bathymetry? slope? lava flow morphology? sediment cover? impacts?**

Fagatele Bay National Marine Sanctuary, America Samoa

Processed at 1 meter per pixel



Mean Depth in Meters

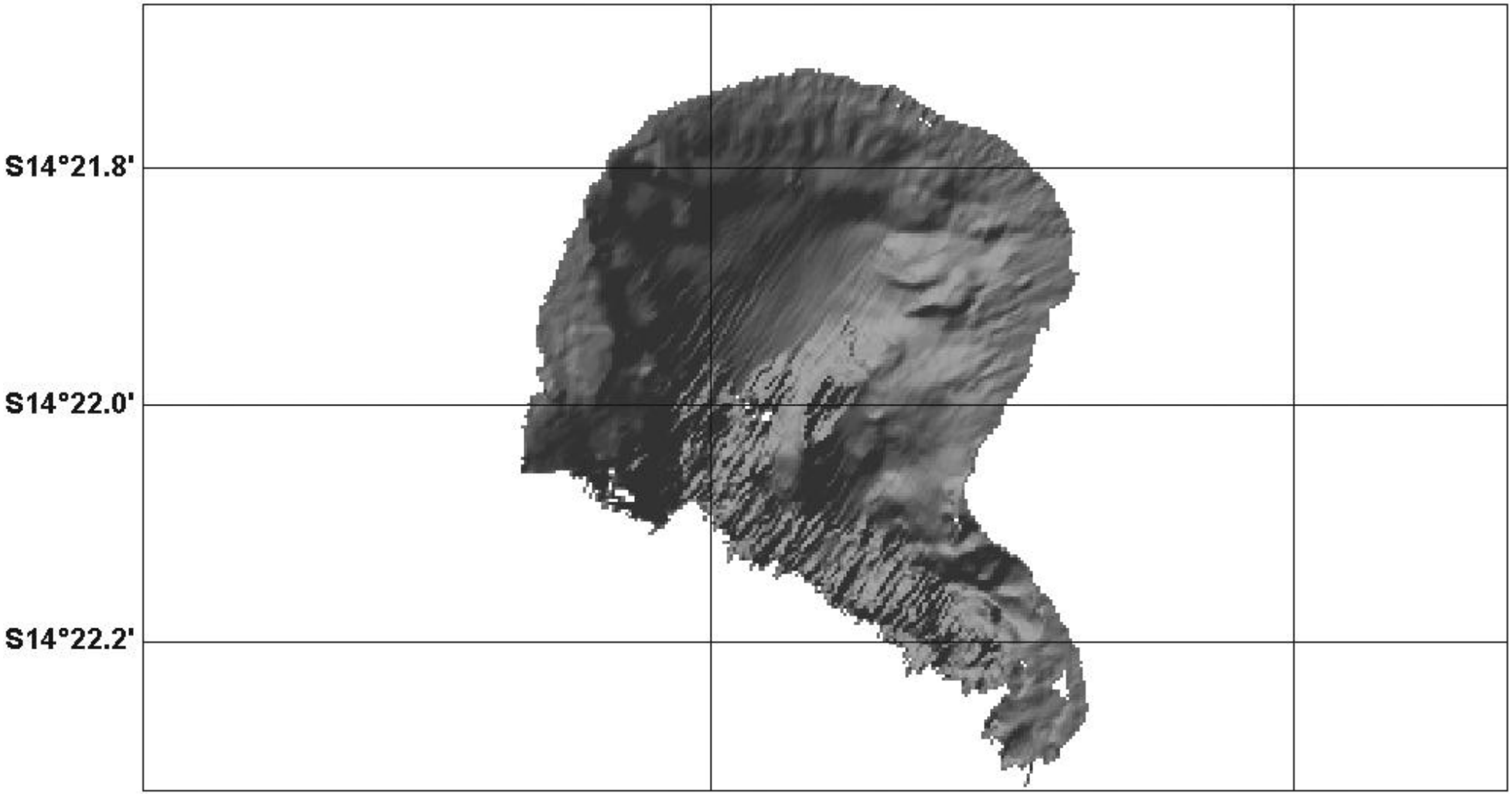
0.44 50 100 145

0 250 500

meters

Fagatele Bay National Marine Sanctuary, America Samoa

Processed at 1 meter per pixel



Fagatele Bay National Marine Sanctuary, America Samoa

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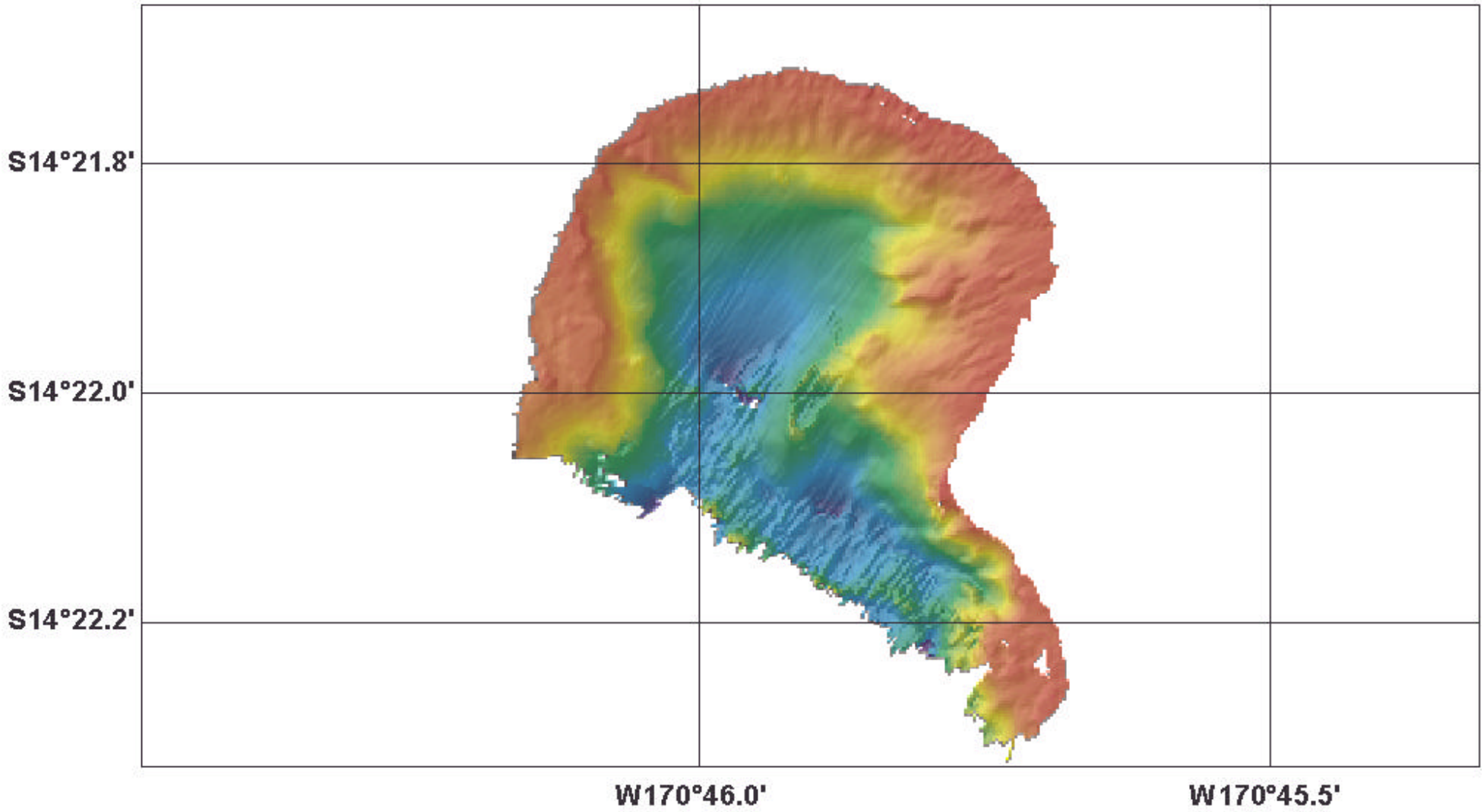


Mean Depth in Meters

0.44 50 100 145

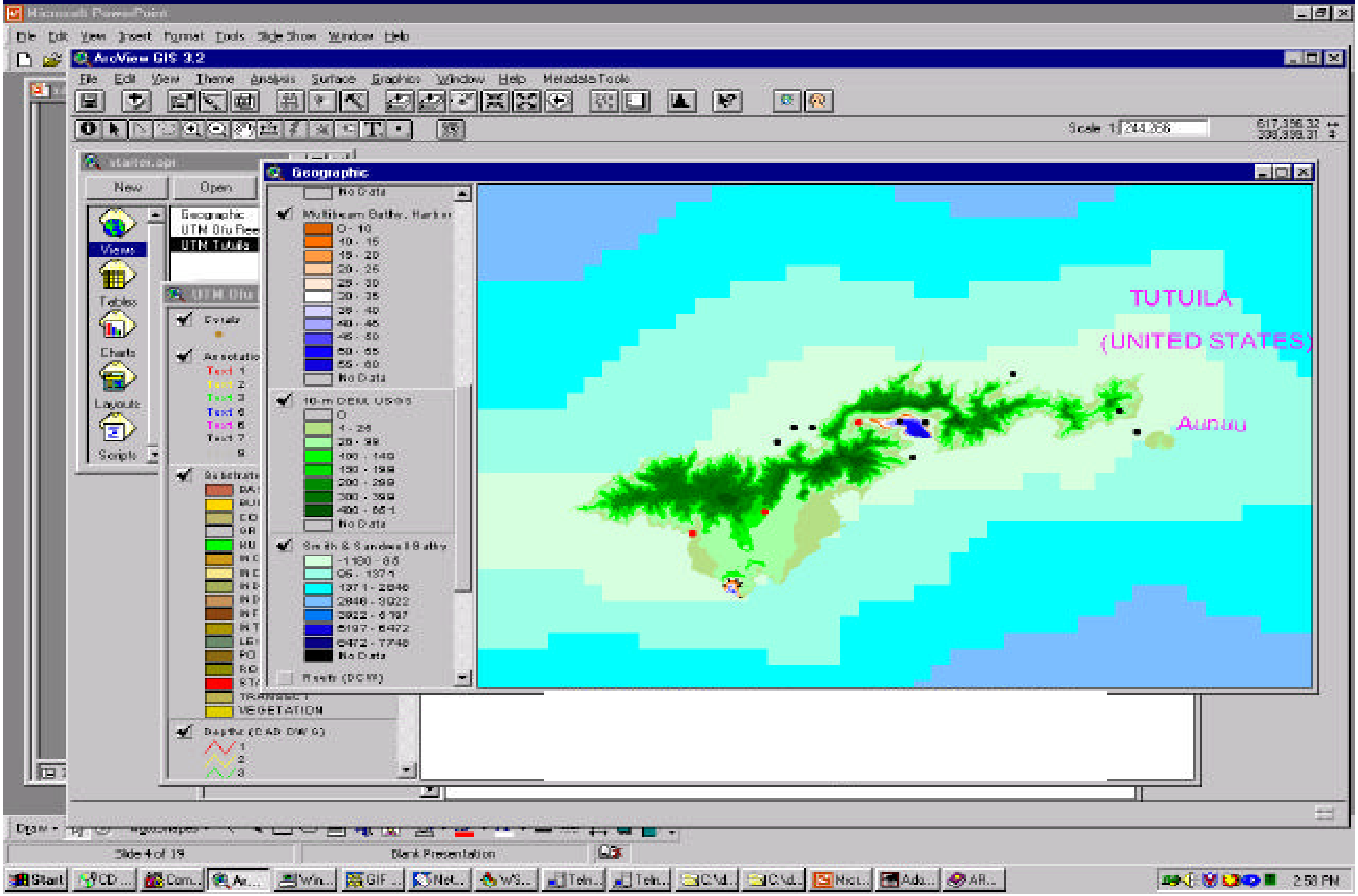
0 250 500

meters

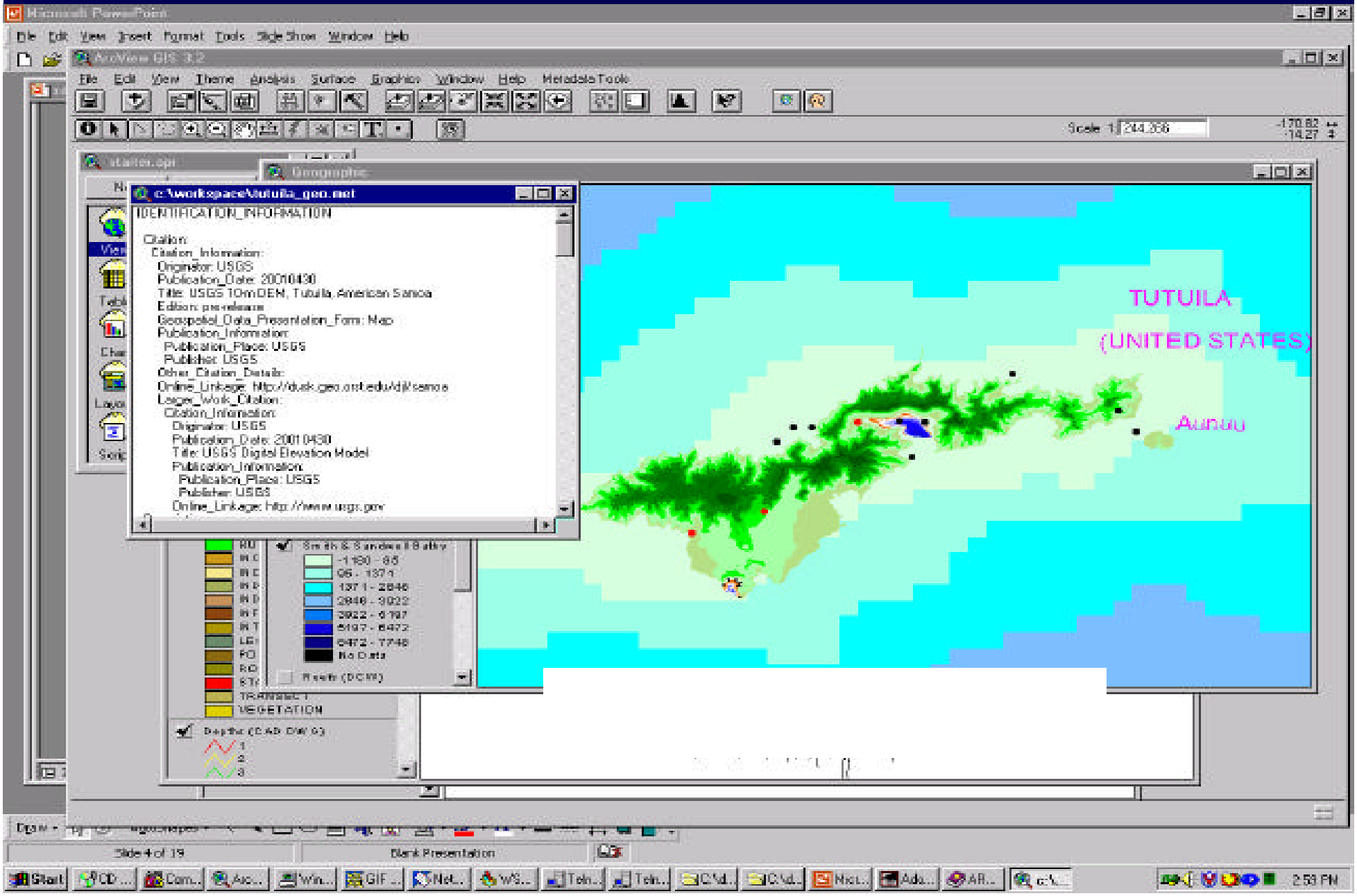
Geographic Information System (GIS)

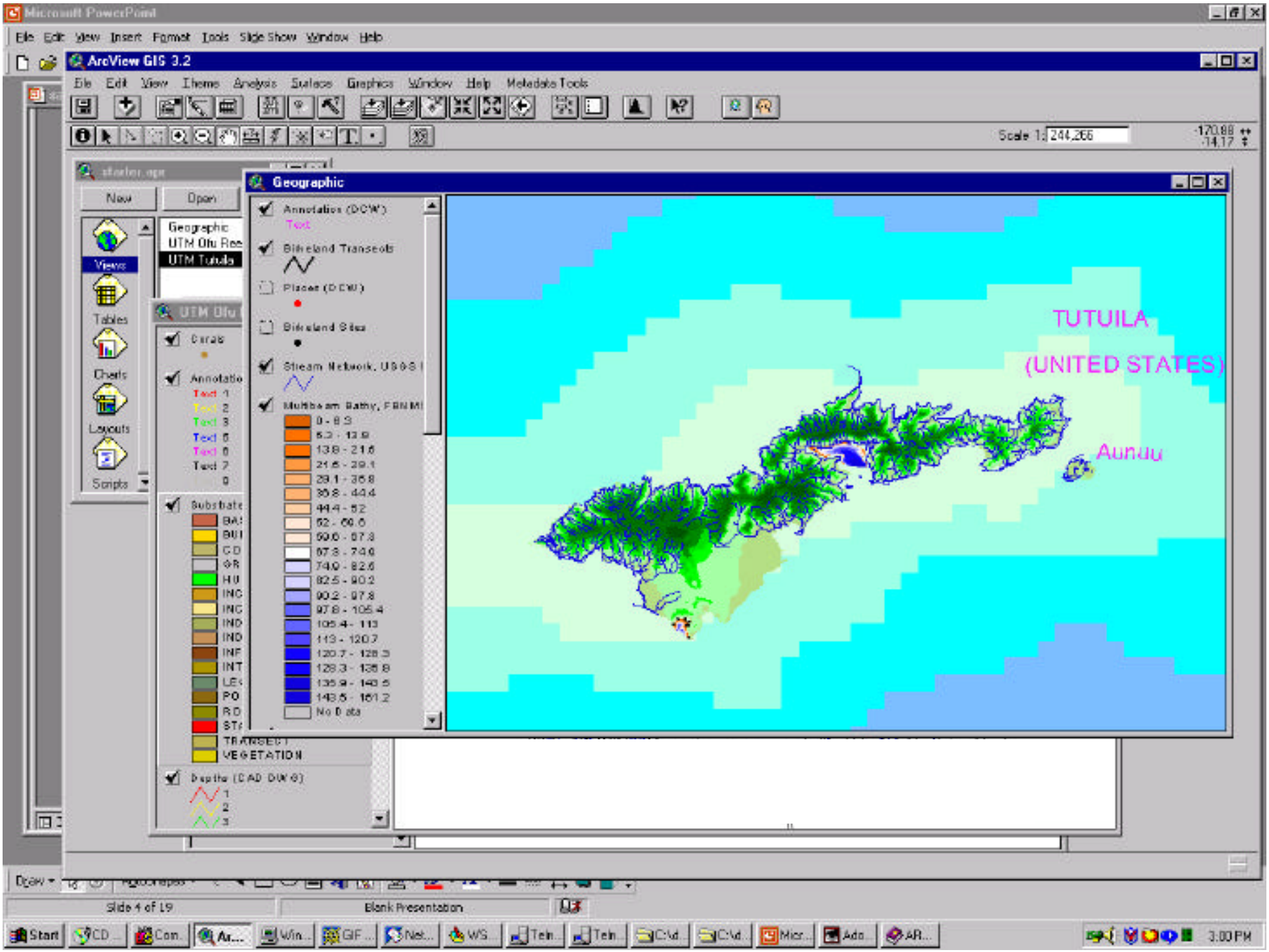
- “smart maps” in computers
- Locations with databases
- Integrate several different data types
- Analysis functions
- Decision-making, planning, science

FBNMS GIS (Av,AI on NT)



FGDC Metadata has been written for ALL layers using the NOAA CSC Metadata Collector tool

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Places (DCW)
Bikeland Sites
Stream Network, USGS
Multibeam Bathy, FBNMS
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21.6 - 29.1
29.1 - 36.8
36.8 - 44.4
44.4 - 52
52 - 59.6
59.6 - 67.3
67.3 - 74.9
74.9 - 82.6
82.5 - 90.2
90.2 - 97.8
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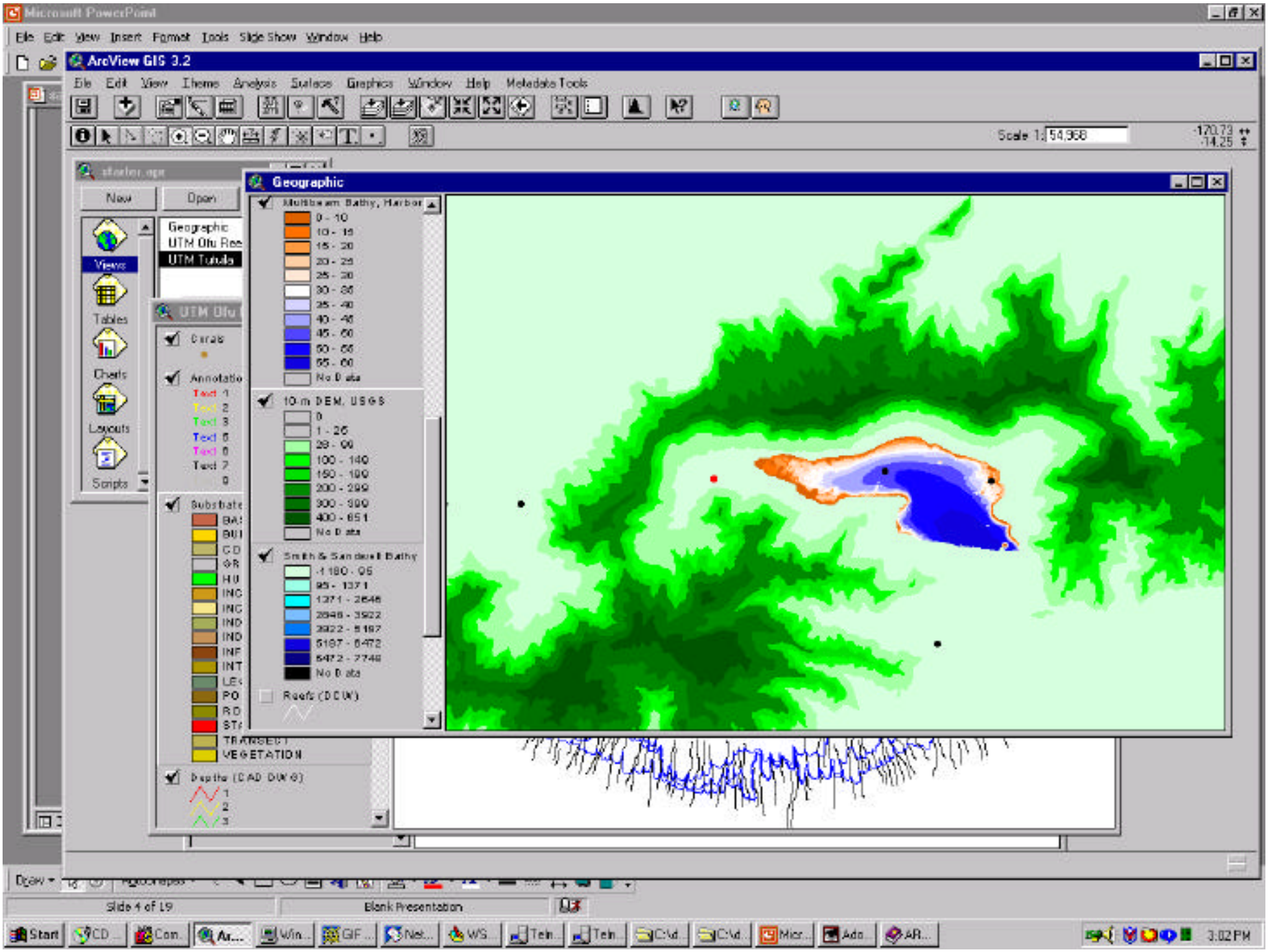
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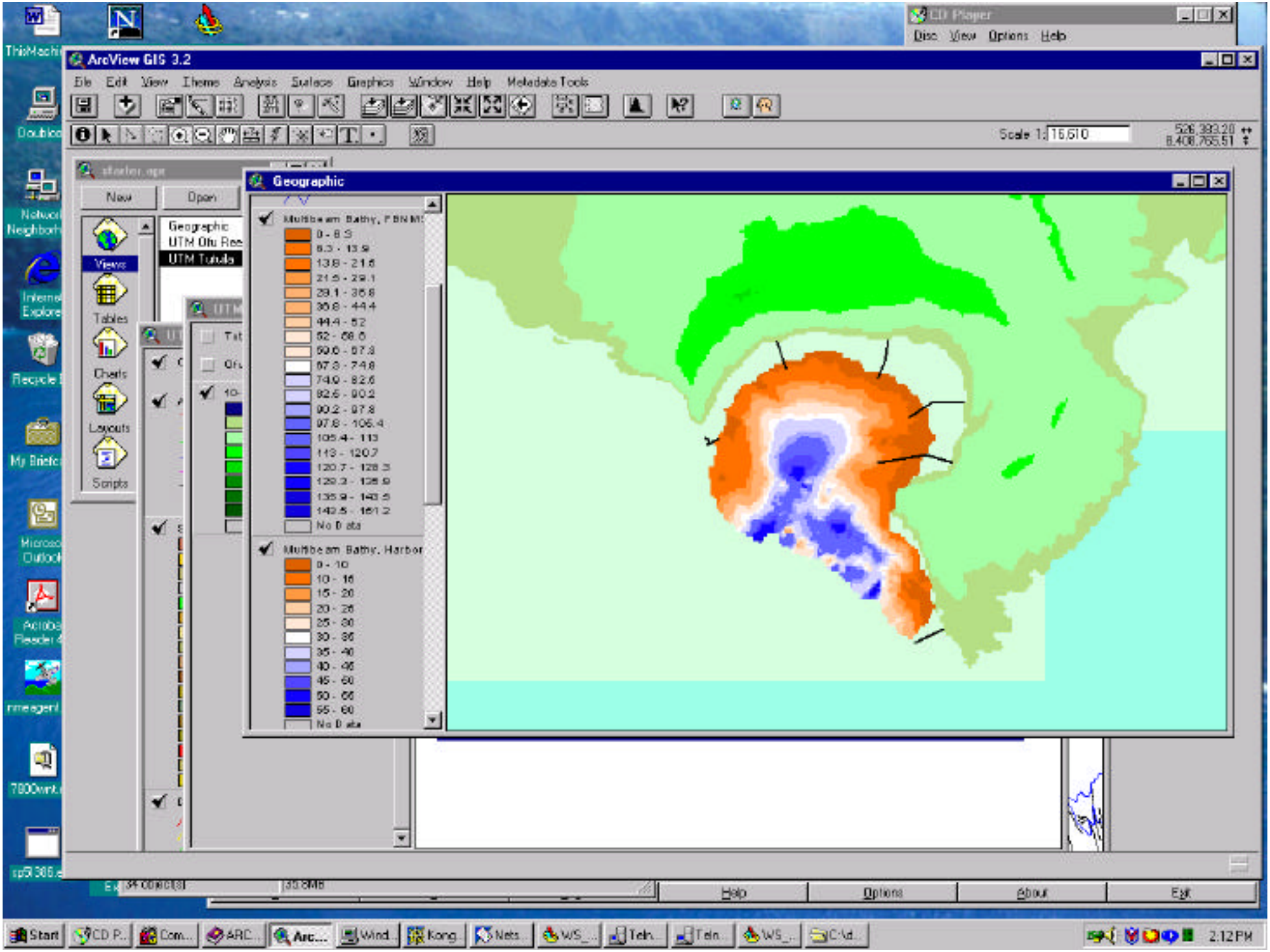
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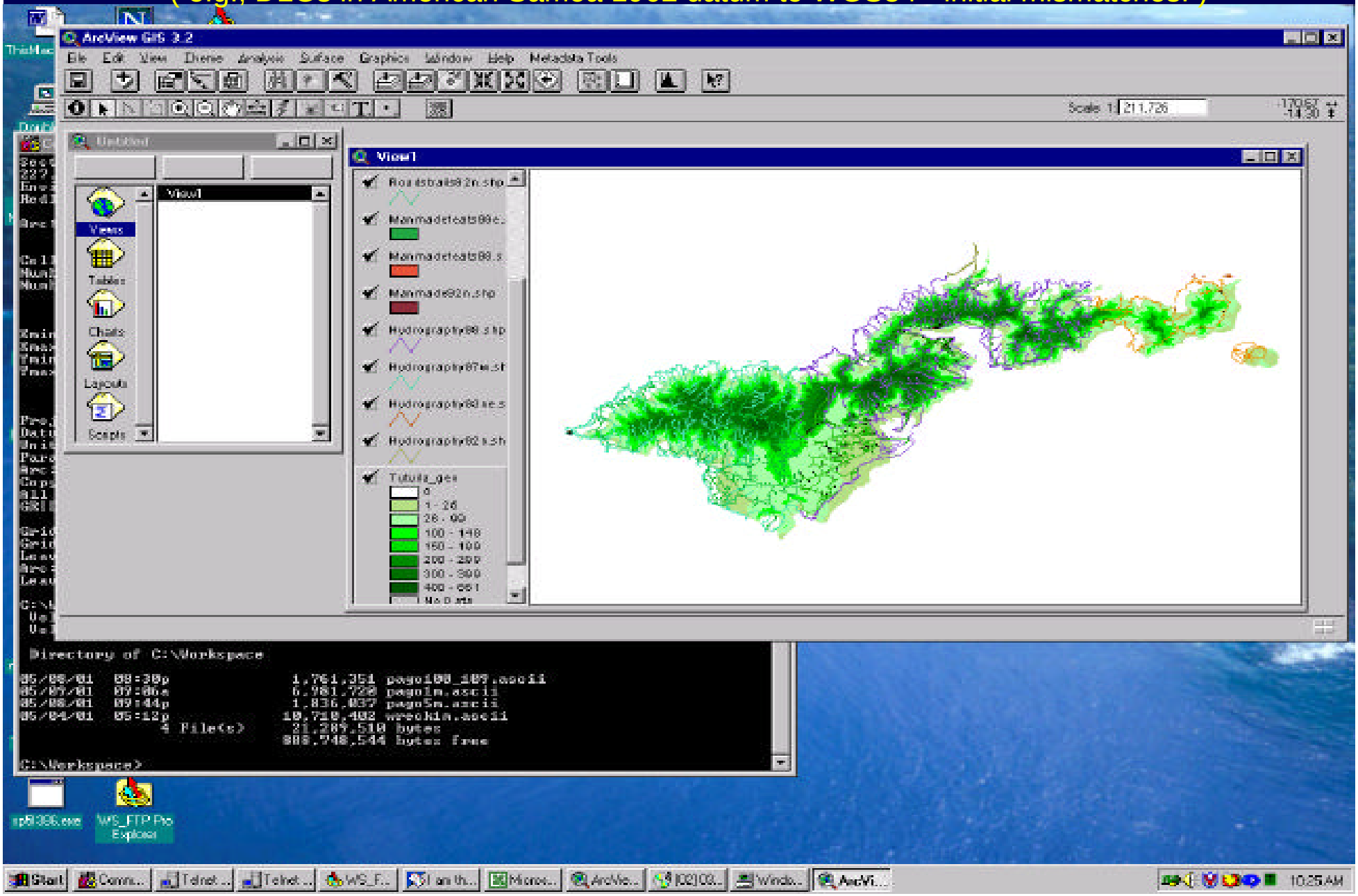
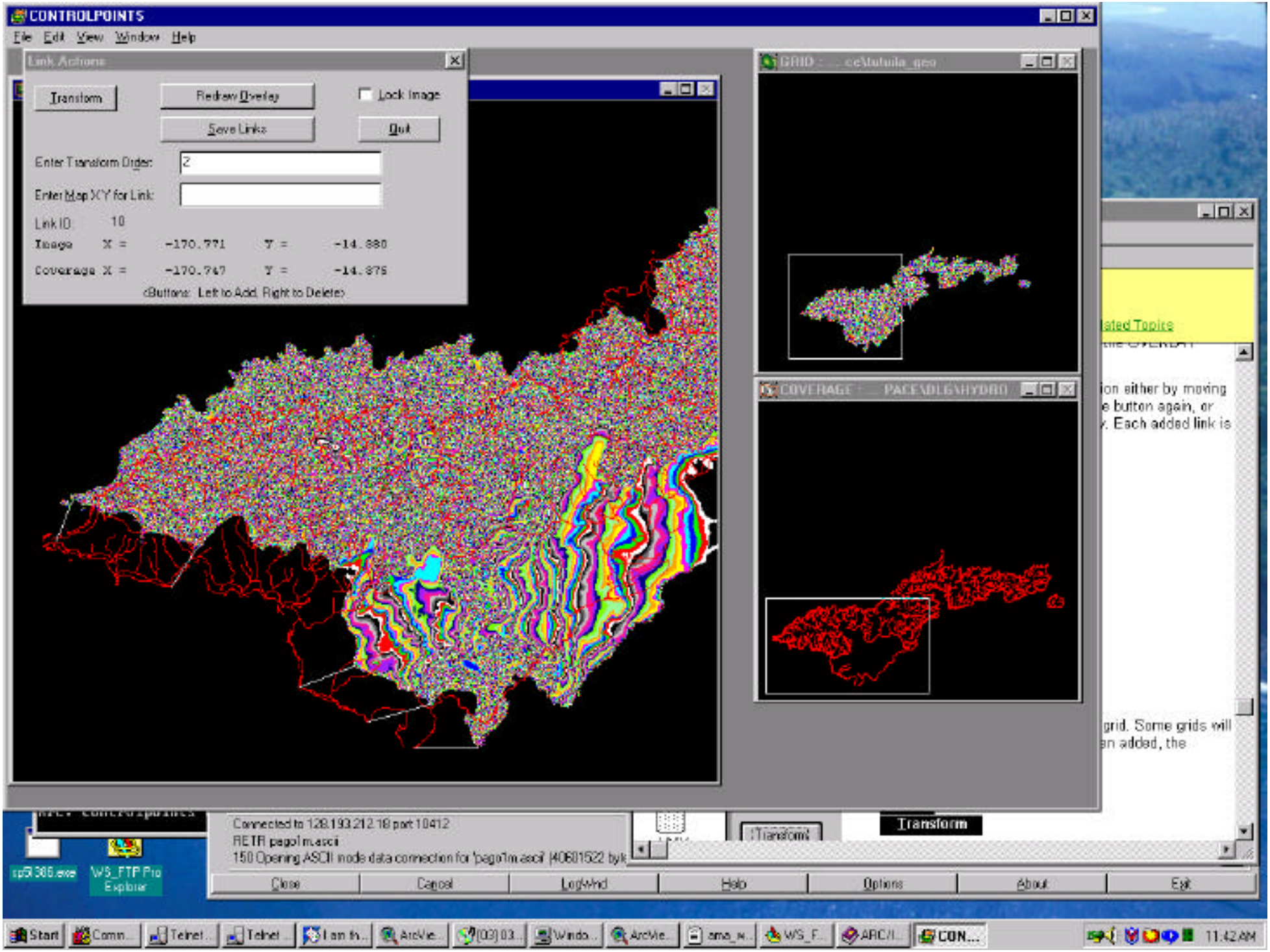
Challenges / Initial Analyses

(e.g., DLGs in American Samoa 1962 datum to WGS84 - initial mismatches!)

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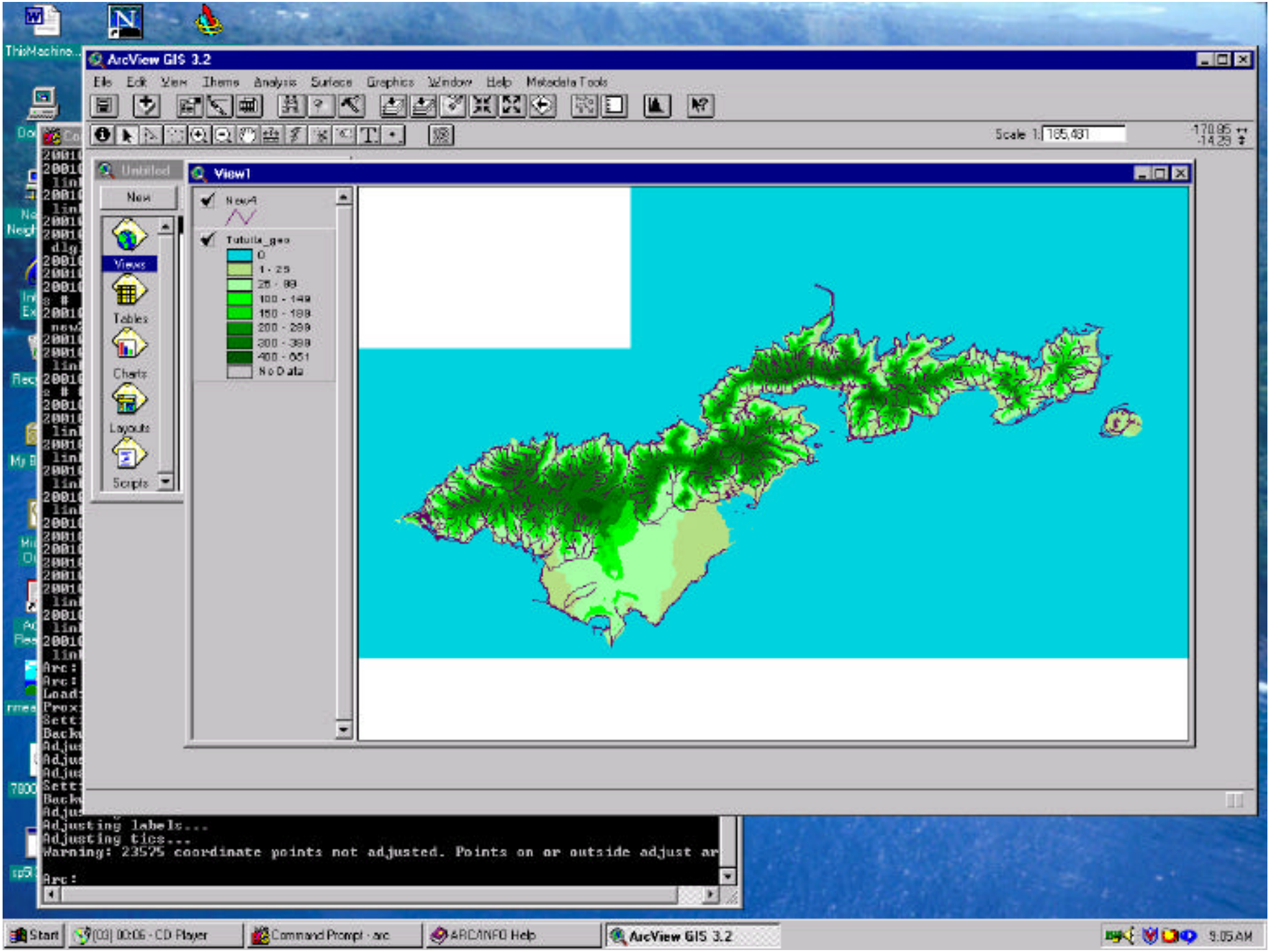
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For more information, and to download data and metadata:

http://dusk.geo.orst.edu/djl/samoa

Fa’afetai!

Image courtesy of FBNMS