Mariana Islands Collection: Multibeam Bathymetry and Backscatter Maps v.1

2007

Marianas Collection: Multibeam Bathymetry and Backscatter Maps

Acknowledgements:

All multibeam bathymetry and backscatter imagery is from the National Oceanic and Atmospheric Administration (NOAA) Pacific Island Fisheries Science Center (PIFSC) Coral Reef Ecosystem Division (CRED) and the Joint Institute for Marine and Atmospheric Research (JIMAR) with funding from NOAA's Coral Reef Conservation Program. All terrestrial Ikonos satellite imagery is from Space Imaging.

The Collection:

This collection of maps was made in 2007 by CRED. They include multibeam bathymetry and backscatter collected in August and September of 2003 from the NOAA survey launch R/V Acoustic Habitat Investigator (AHI), supported by the NOAA Ship Oscar Elton Sette. Details on the surveys, platforms and processing may be found in the metadata appendix. Some of the maps also include Ikonos satellite imagery for reference to land features.

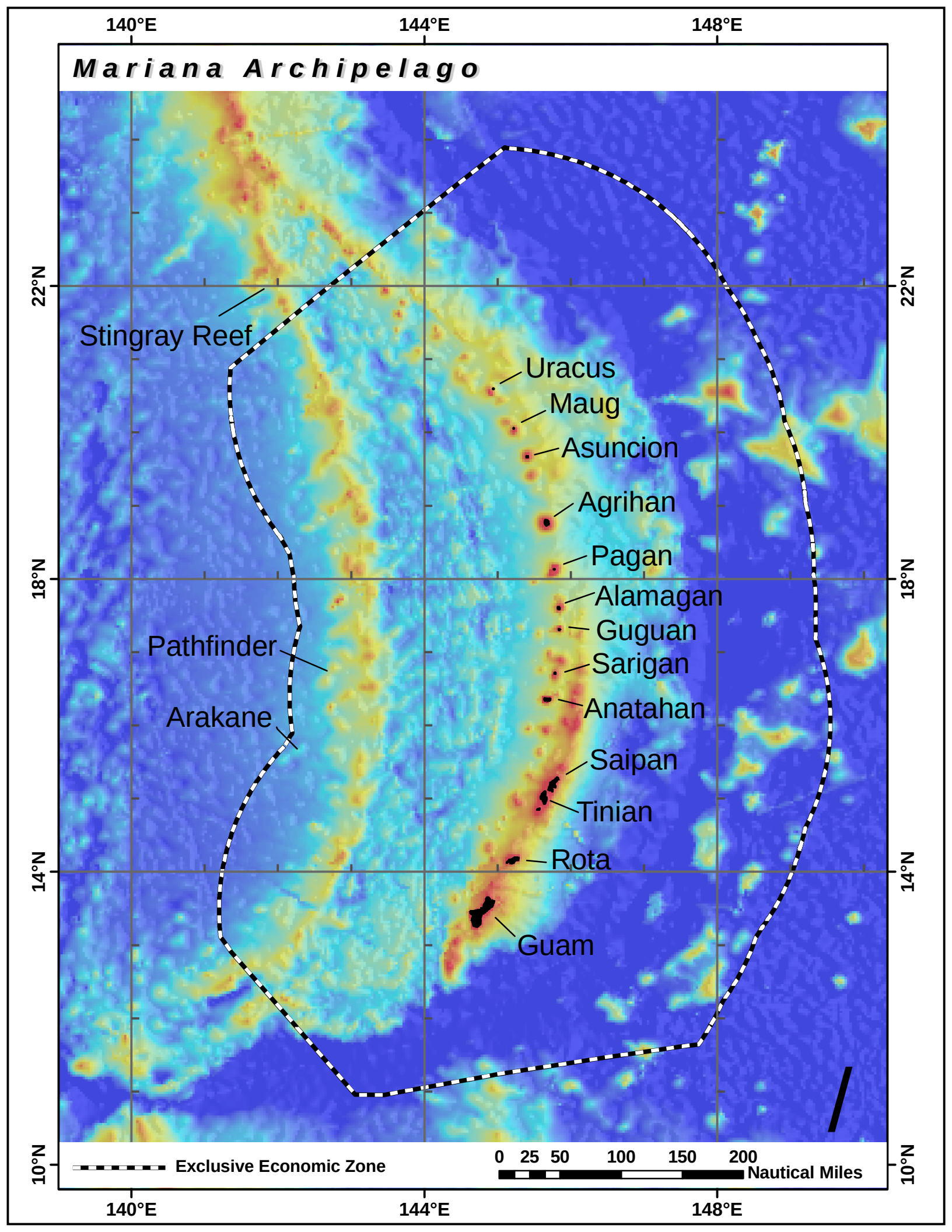
These data are not for navigation. The data were collected in support of Coral Reef Conservation Program goals to map all shallow (0-30 m) coral reefs in US Pacific waters and priority moderate (> 30 m) depth areas by 2009. The data are being used to provide bathymetric and backscatter data for previously unmapped areas and to study the area geology in support of ecosystem management (e.g. benthic habitat mapping for Essential Fish Habitat determination).

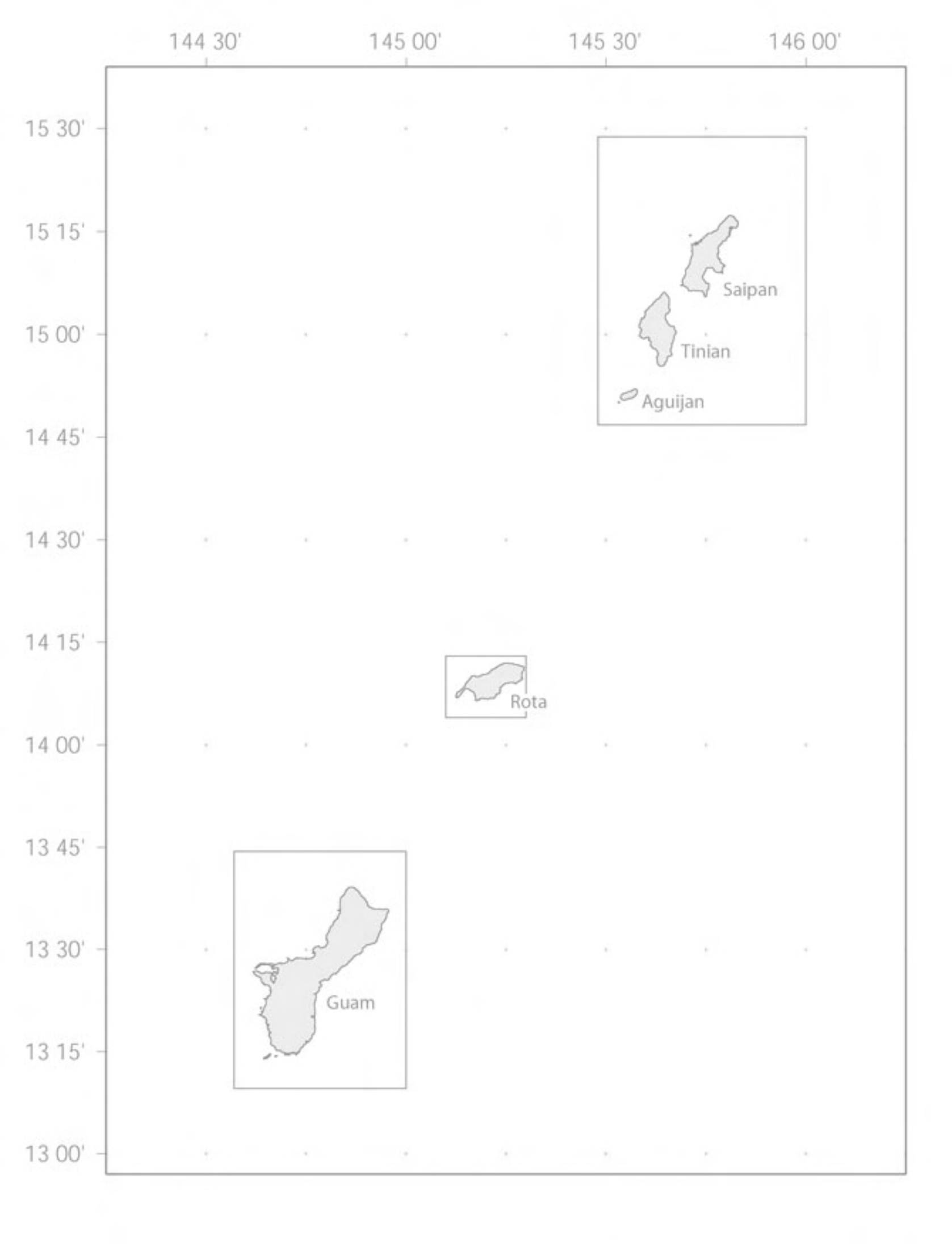
The bathymetry (depth) data are represented with a red to blue color ramp where red is the most shallow and blues are deep. The backscatter (acoustic intensity) data are represented with a white to black color ramp where black is a high return and white is a low return. Generally, the dark backscatter indicates hard bottom (e.g. coral, rock), the light backscatter indicates soft bottom (e.g. sand, mud), and grays are mixed (e.g. rubble, sand/pavement). See individual maps for depth and intensity values.

The Metadata Appendix:

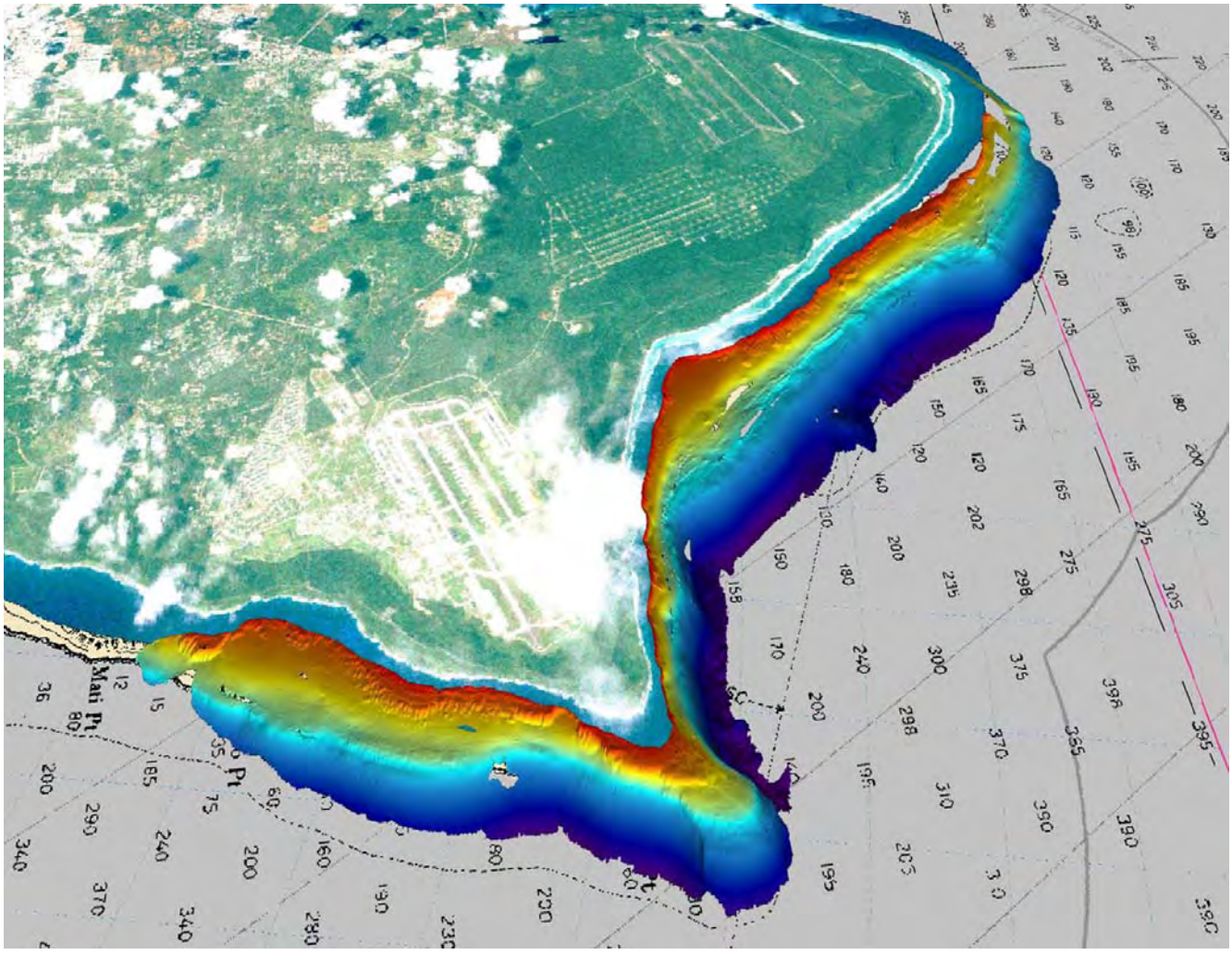
The metadata appendix includes a file for each Guam and CNMI bathymetry and backscatter imagery product that is served on the Pacific Islands Benthic Habitat Mapping Center (PIBHMC) website (http://www.soest.hawaii.edu/pibhmc/pibhmc_cnmi.htm). In this case, the most likely data type that users in Guam and CNMI would download is the ASCII format. Therefore, the metadata that are included are for the ASCII products, although most of the background information and instrument/platform details are the same for the netCDF data type as well. Aditionally, cruise metadata for the cruise, AHI-03-07, outlining the details of the acquisition system are included in the appendix.

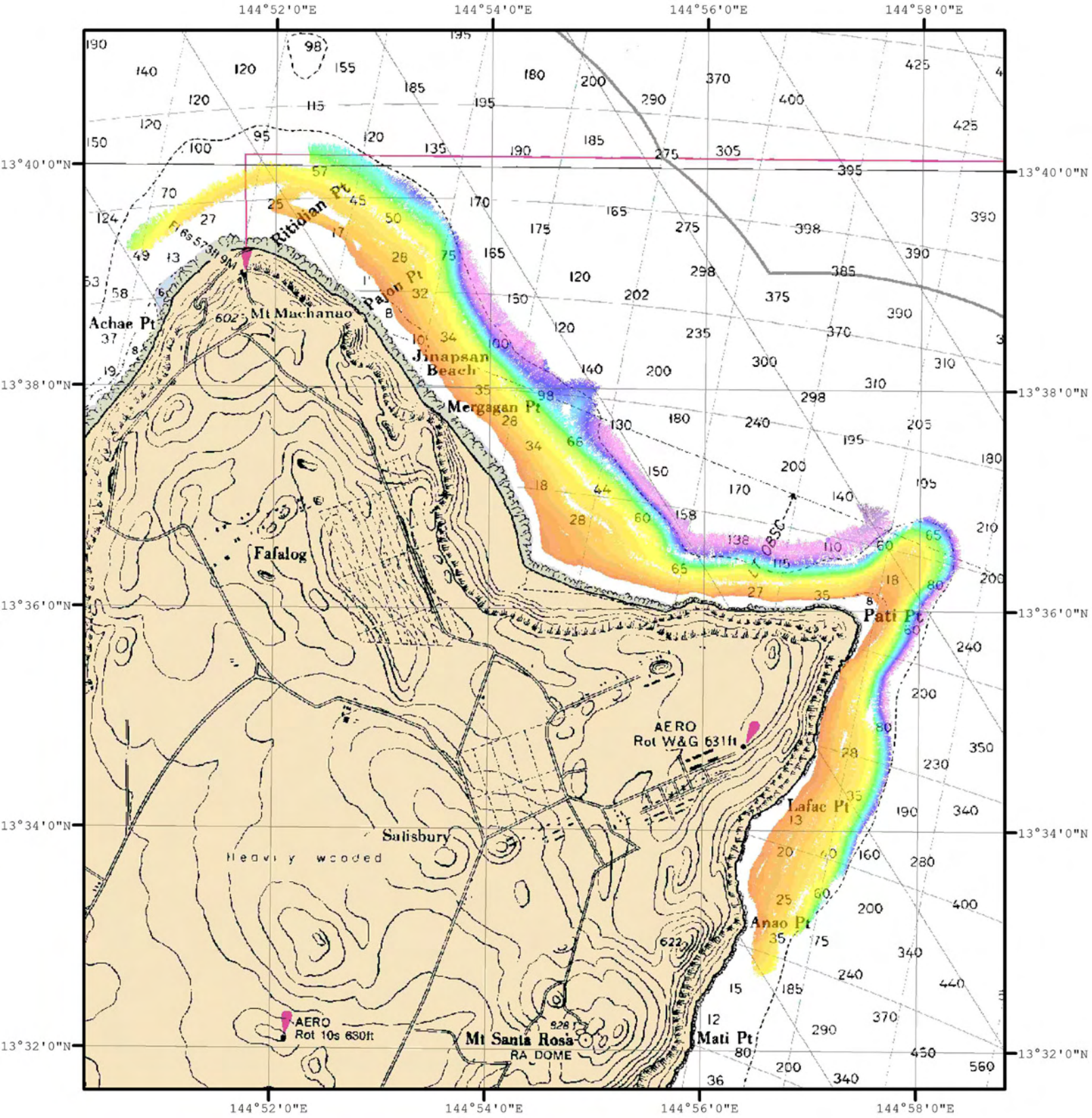
The Marianas Reef Assessment and Monitoring Program cruise aboard the Hi'ialakai (HI-07-01, HI-07-02, and HI-07-03), with survey launch R/V AHI (AHI-07-01, AHI-07-02, and AHI-07-03) , will return to the Mariana Islands in April until June of 2007. Upon completion of the field season, data processing and map production, this map collection will be updated and redistributed. Contact pibhmc@soest.hawaii.edu for more information.

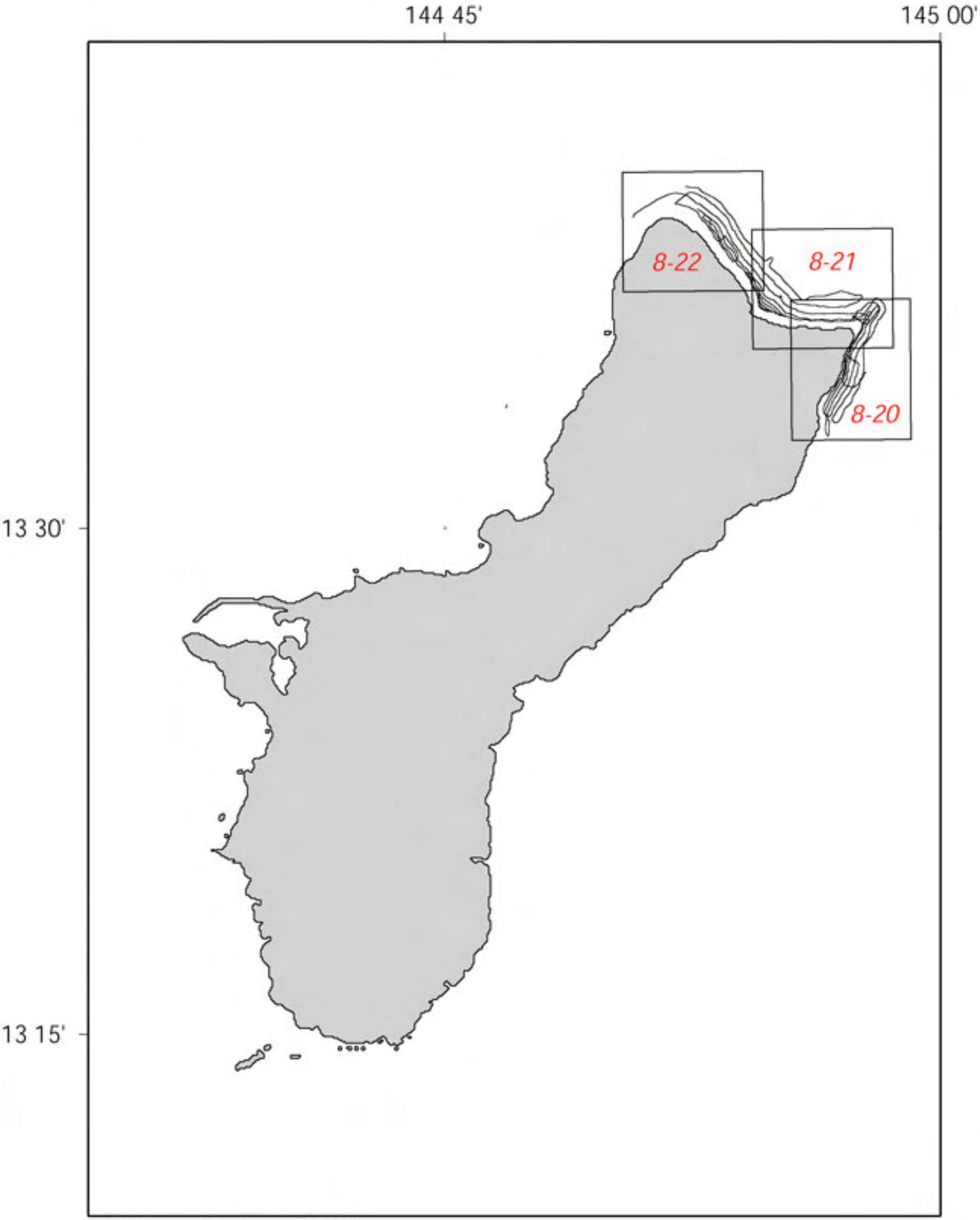

Mariana Archipelago
140°E
144°E
148°E
22°N
18°N
14°N
10°N
Stingray Reef
Uracus
Maug
Asuncion
Agrihan
Pagan
Alamagan
Guguan
Sarigan
Anatahan
Saipan
Tinian
Rota
Guam
Pathfinder
Arakane
Exclusive Economic Zone
0 25 50 100 150 200
Nautical Miles


144 30'
145 00'
145 30'
146 00'
15 30'
15 15'
15 00'
14 45'
14 30'
14 15'
14 00'
13 45'
13 30'
13 15'
13 00'
Saipan
Tinian
Aguijan
Rota
Guam

Guam




144°52'0"E
144°54'0"E
144°56'0"E
144°58'0"E
13°40'0"N
13°38'0"N
13°36'0"N
13°34'0"N
13°32'0"N
Ritidian Pt
Fl 6s 573ft 9M
Achae Pt
Mt Machanao
Jinapsan Beach
Mergagan Pt
Fafalog
Salisbury
Heavily wooded
AERO
Rot W&G 631ft
Pati Pt
Lafac Pt
Anao Pt
AERO
Rot 10s 630ft
Mt Santa Rosa
RA DOME
928 ft
Mati Pt
OBSC



R/V AHI Trackline Navigation | August 2003

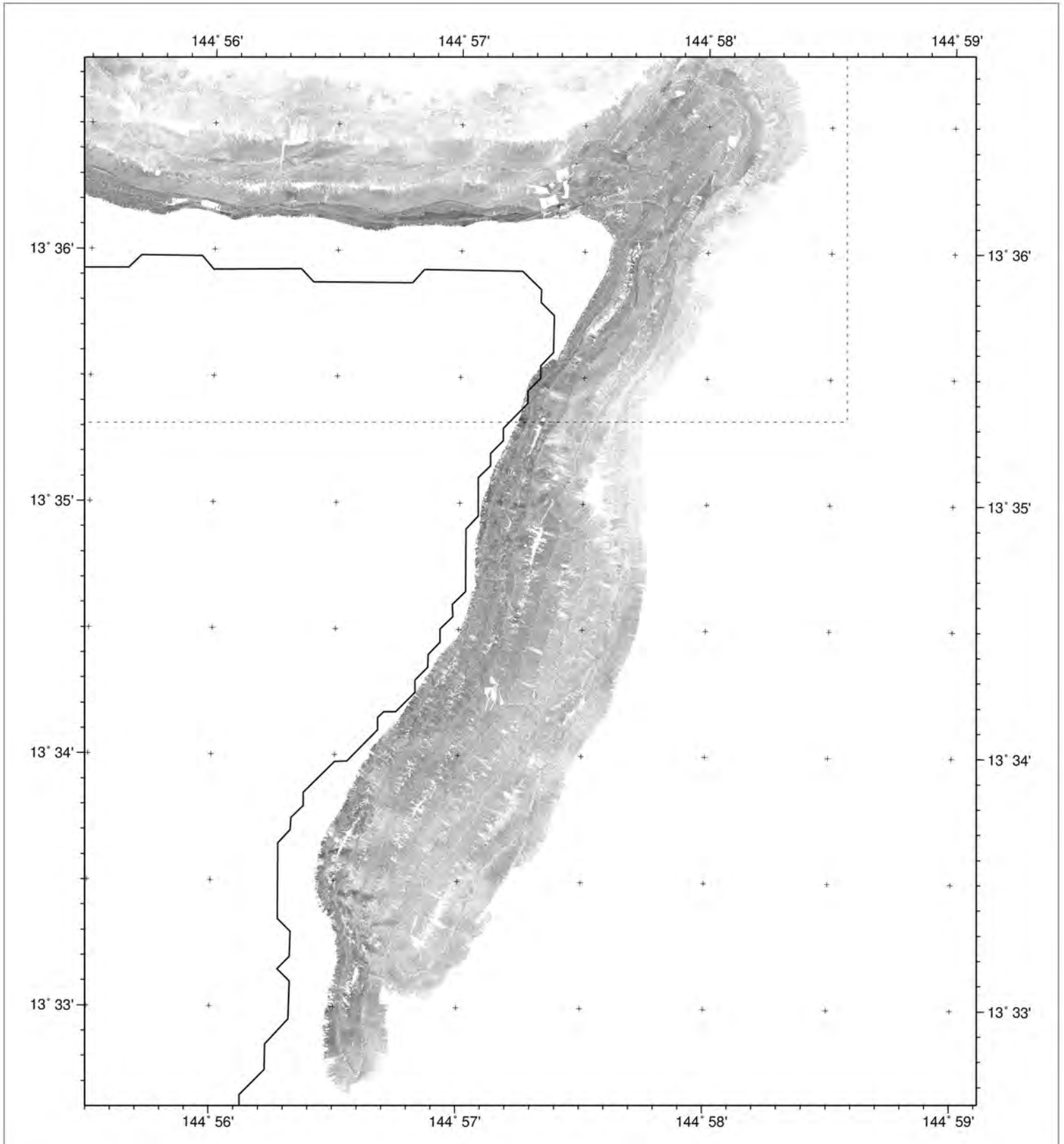


Chart 8-20

North Guam
ahi0304 ACOUSTIC IMAGERY

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*
NOT FOR Navigation

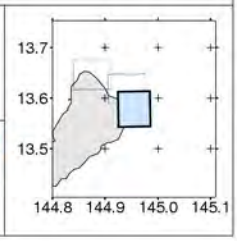
Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55
nautical miles
0 0 kilometers 1 1

low Backscatter Magnitude high

Grid size: 1 m
Elipsoid: WGS-84
Equipment: POS-MV CA-GPS
Coastline: GMT WVS and WDBII database

NOAA CORAL REEF ECOSYSTEM INVESTIGATION

HAWAI'I MAPPING RESEARCH GROUP



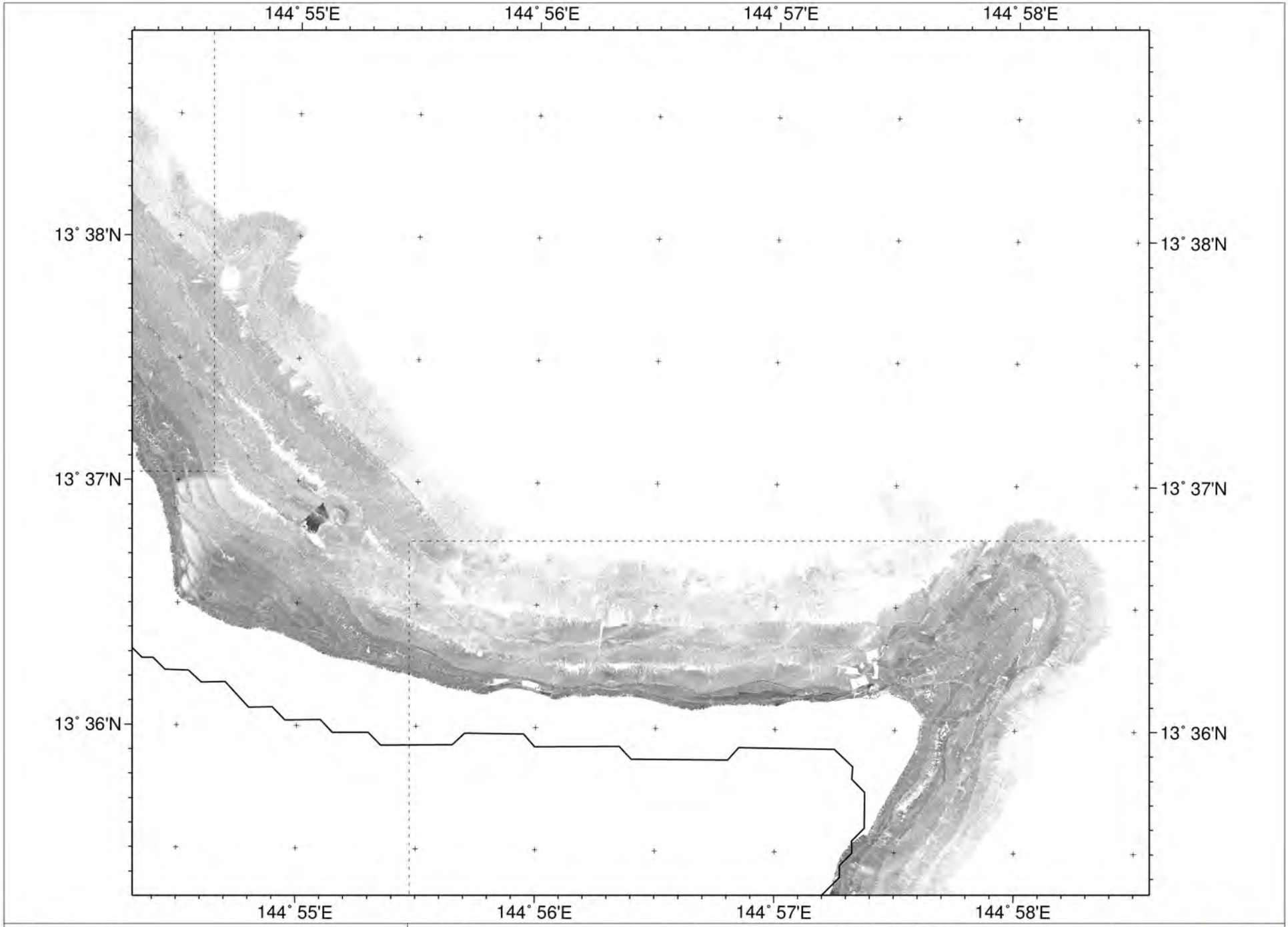


Chart 8-21
North Guam

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*

ahi0304 ACOUSTIC IMAGERY

Grid size: 1 m
Coastline: GMT WVS and WDBII database
NOT FOR NAVIGATION

Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55 WGS-84

nautical miles
0 1
kilometers
0 1

Backscatter Magnitude
low high

13.7
13.6
13.5
144.8 144.9 145.0 145.1

NOAA CORAL REEF ECOSYSTEM INVESTIGATION

HAWAI'I MAPPING RESEARCH GROUP

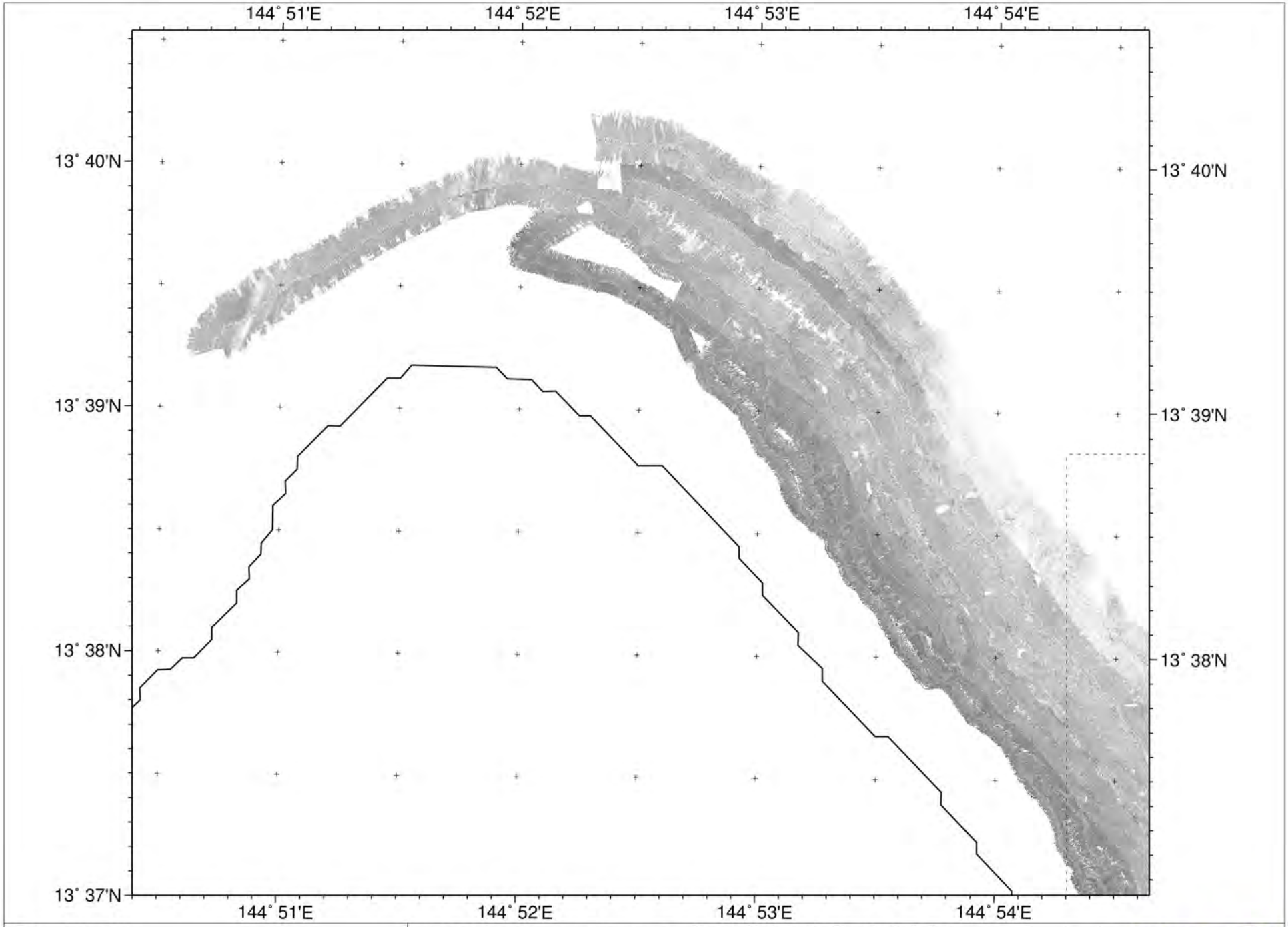


Chart 8-22
North Guam

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*

ahi0304 ACOUSTIC IMAGERY

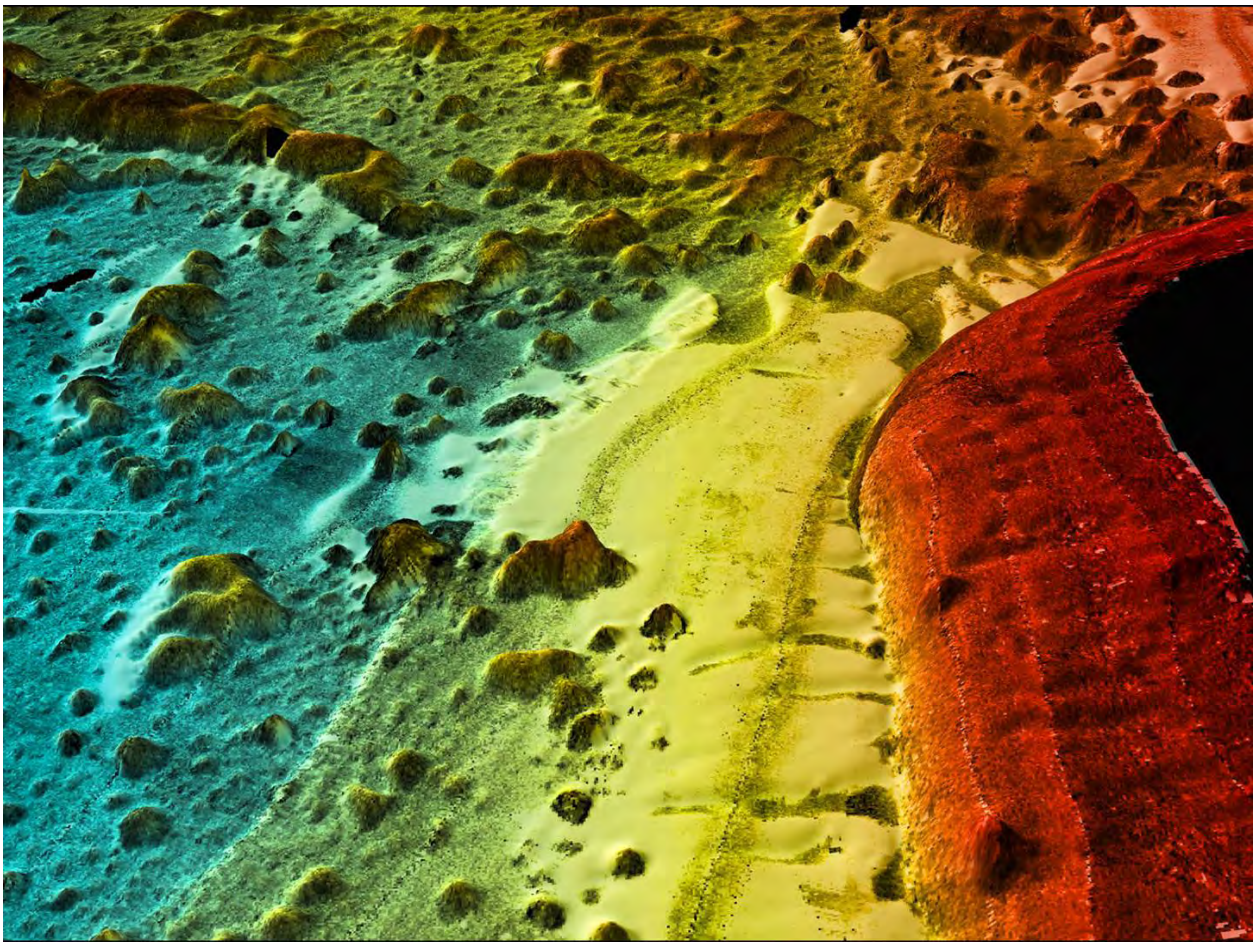
Grid size: 1 m
Coastline: GMT WVS and WDBII database
NOT FOR NAVIGATION

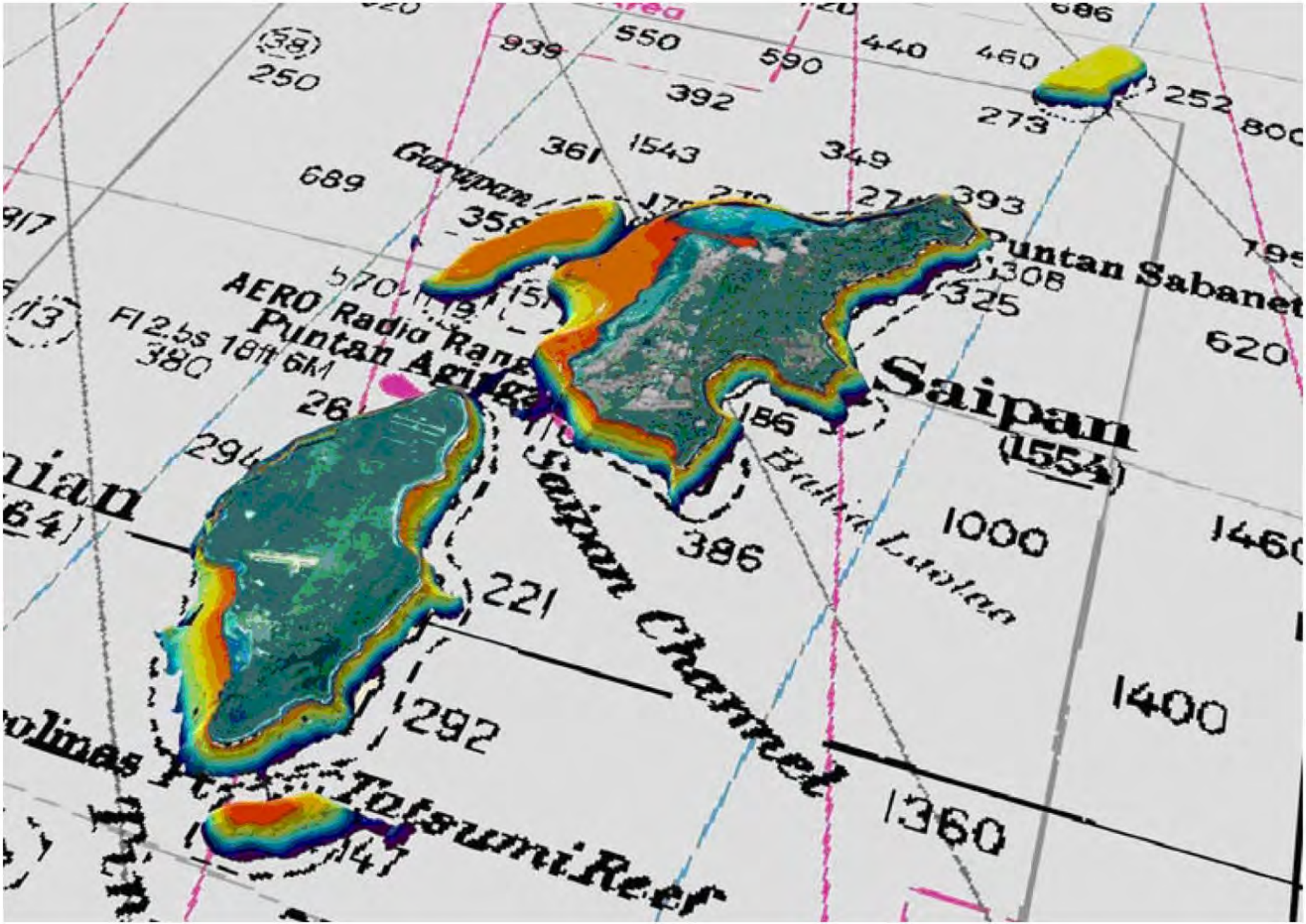
Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55 WGS-84
nautical miles
0 1
0 kilometers 1
Backscatter Magnitude
low high

13.7
13.6
144.8 144.9 145.0

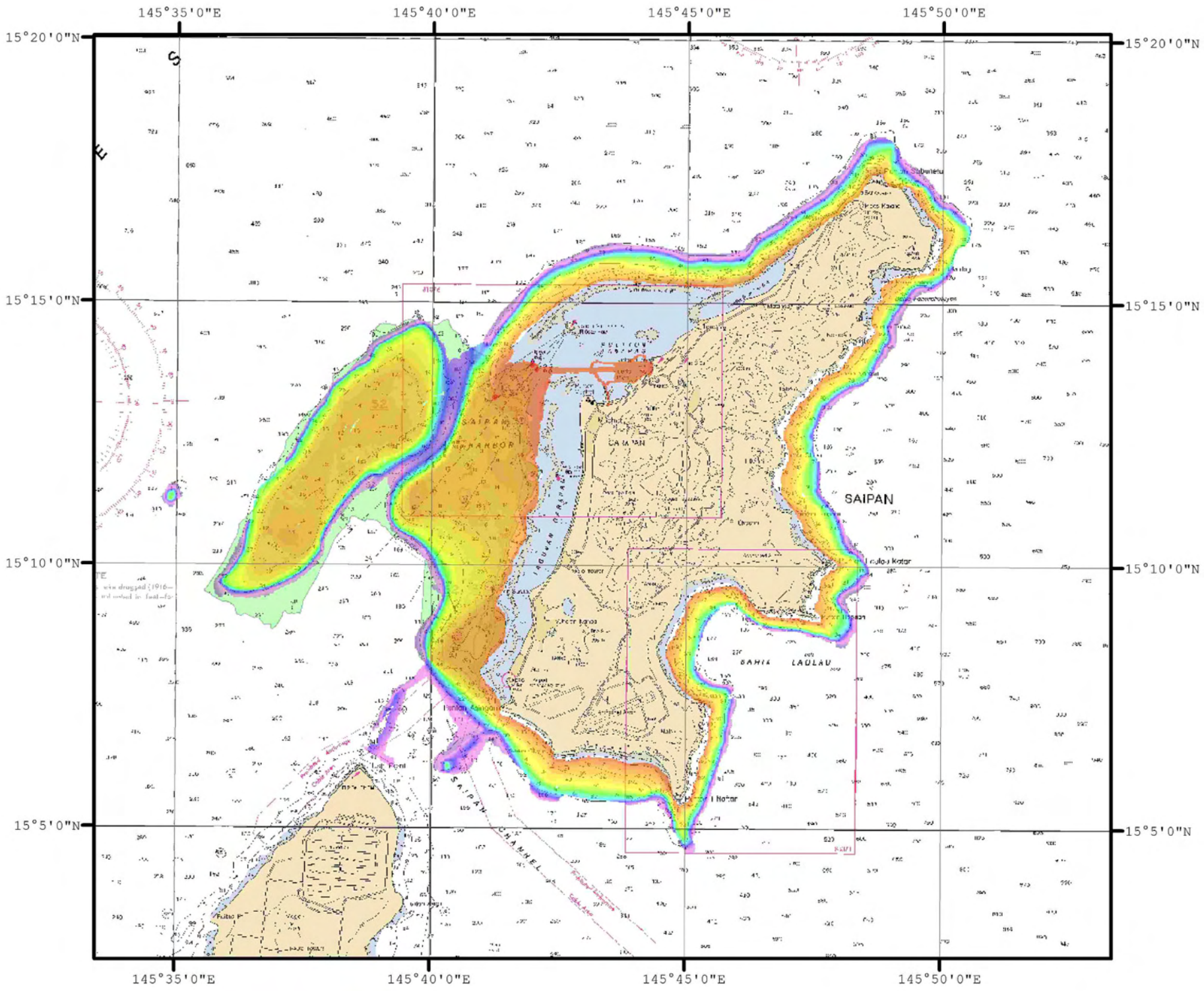
NOAA CORAL REEF ECOSYSTEM INVESTIGATION
HAWAI'I MAPPING RESEARCH GROUP

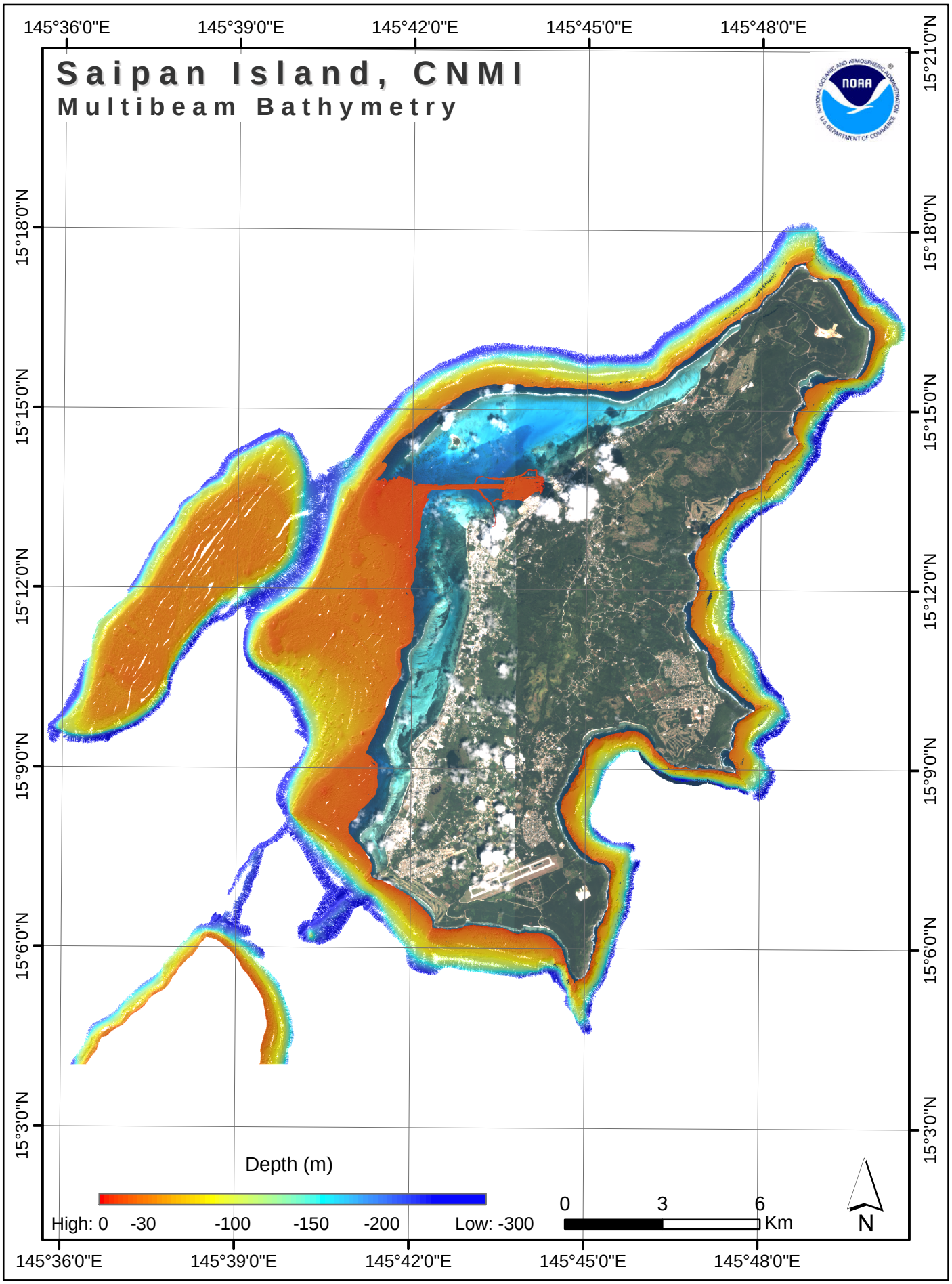
Saipan

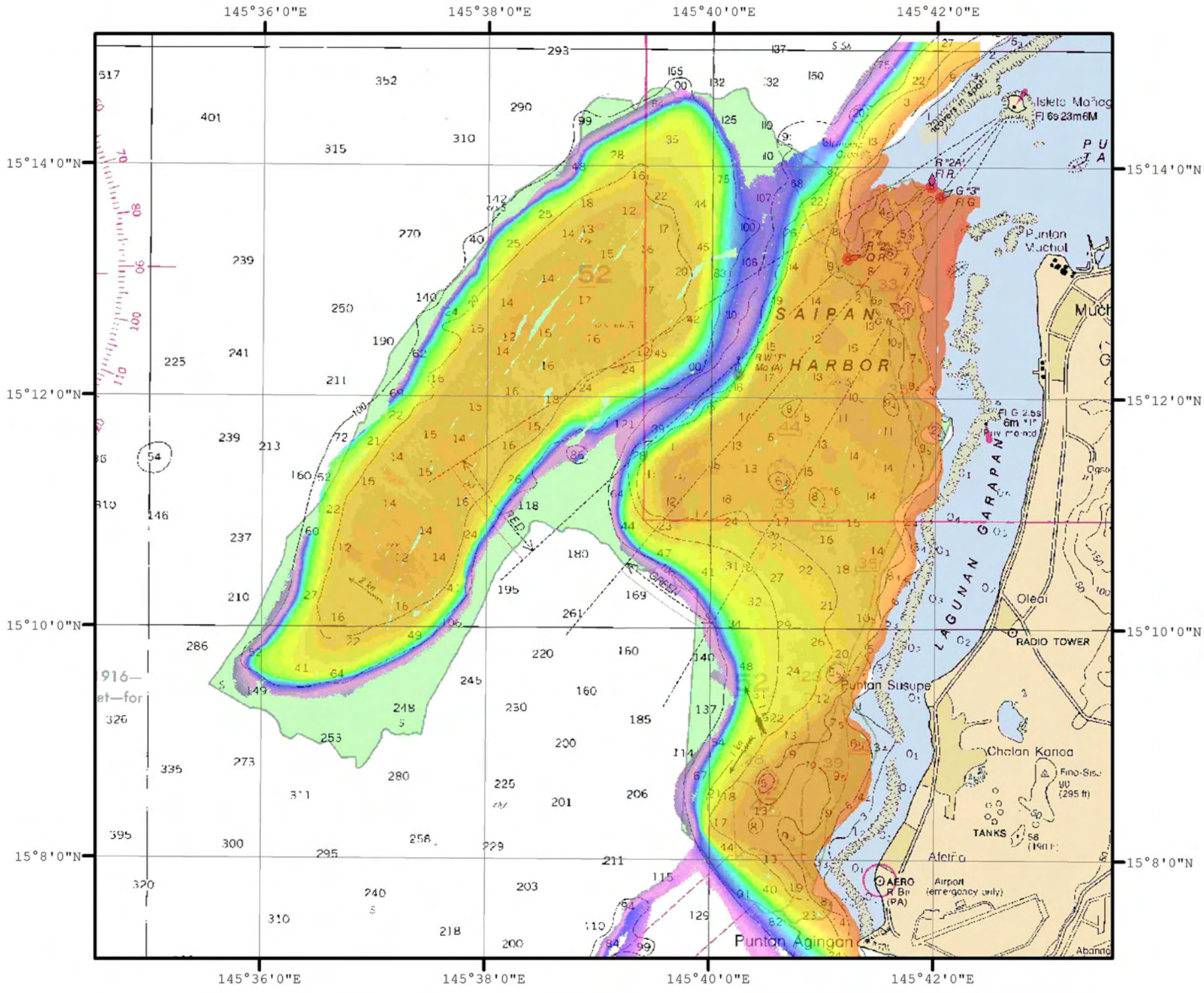


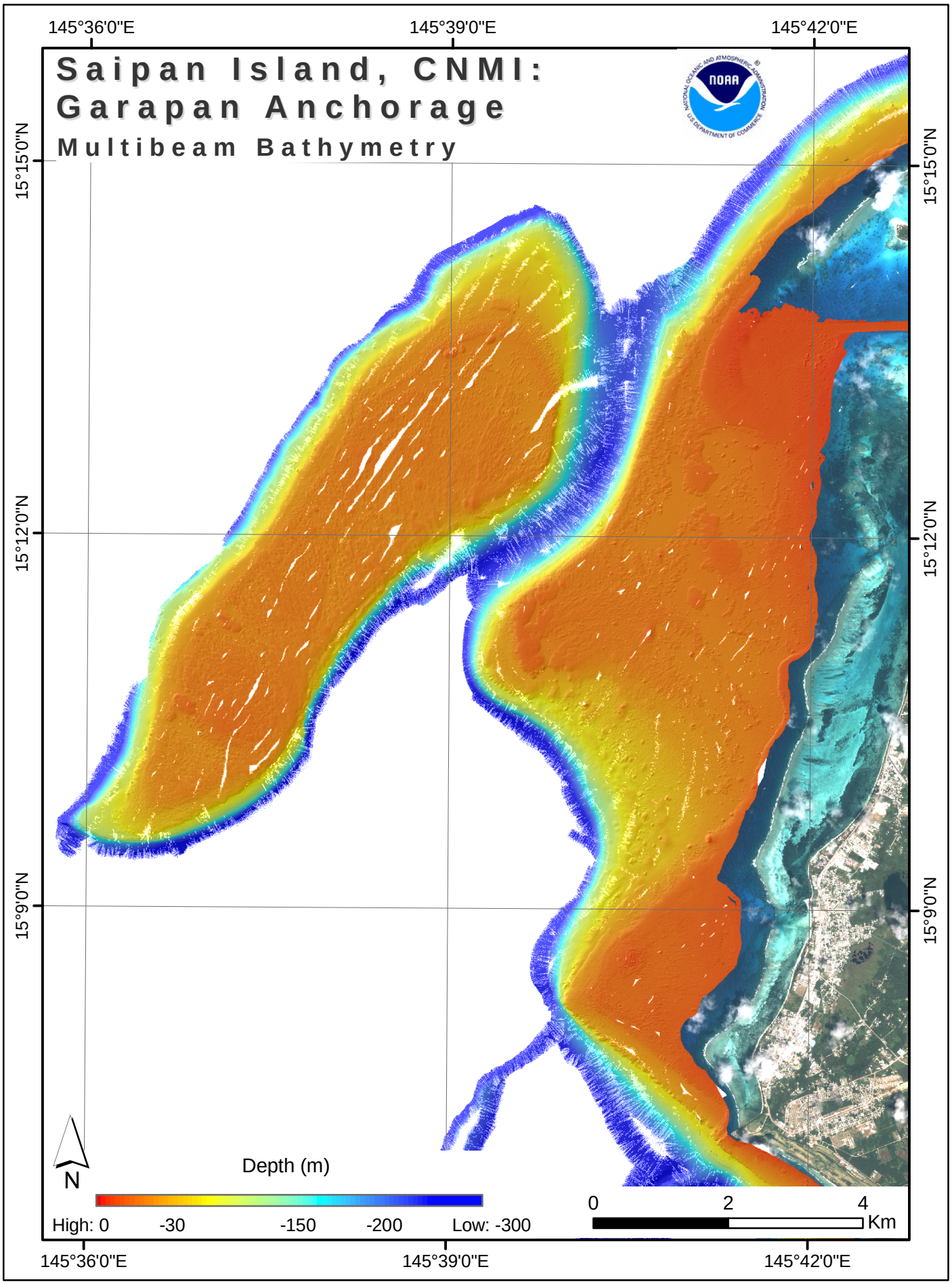


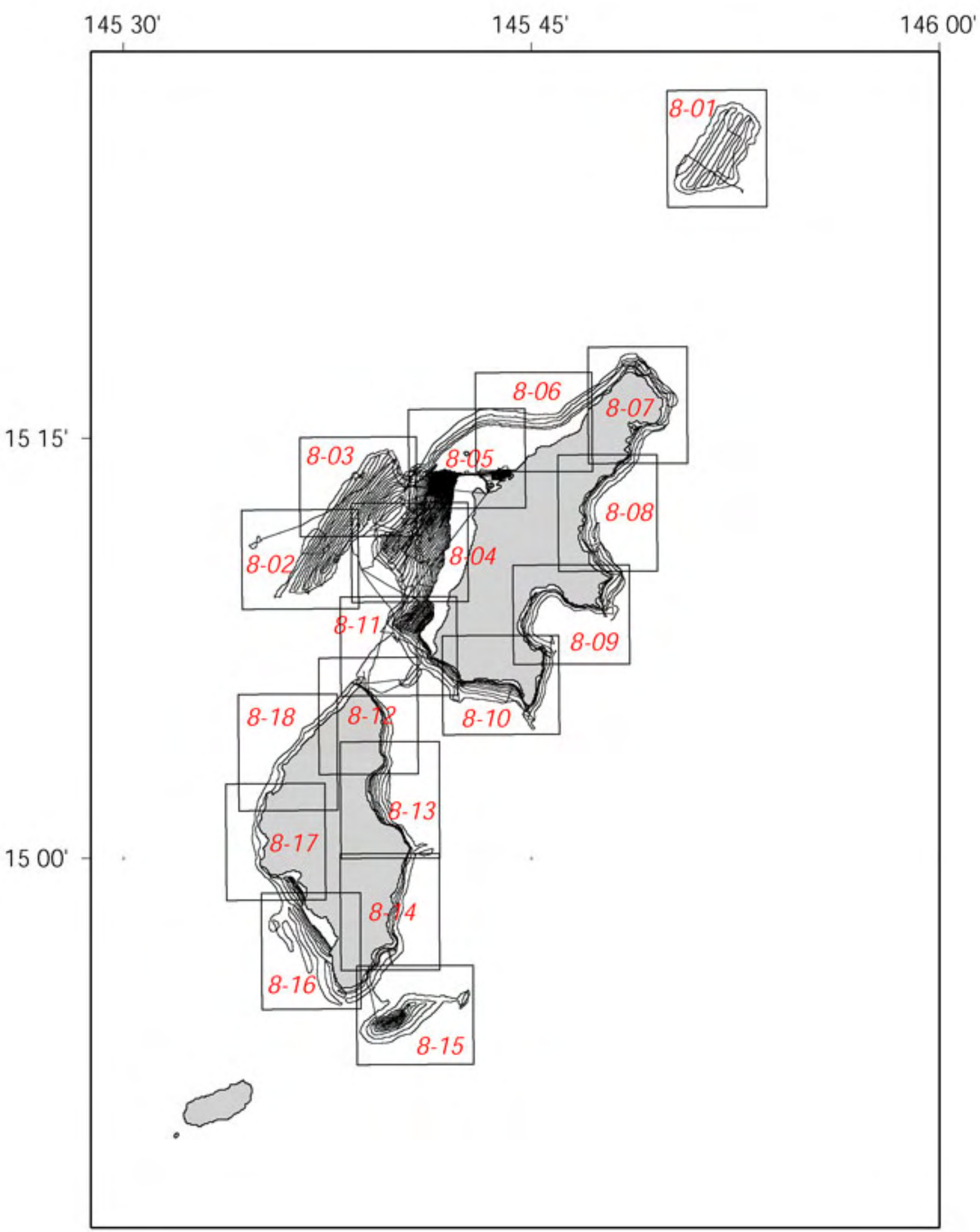
3D Perspective of Multibeam Bathymetry and IKONOS imagery around (from bottom left (South) to top right (North)) Tatsumi, Tinian, Saipan, and Marpi. These data were collected in 2003.


145°35'0"E
145°40'0"E
145°45'0"E
145°50'0"E
15°20'0"N
15°15'0"N
15°10'0"N
15°5'0"N
SAIPAN
SAIPAN HARBOR
LAULAU BAY
SAIPAN CHANNEL


Saipan Island, CNMI
Multibeam Bathymetry
145°36'0"E
145°39'0"E
145°42'0"E
145°45'0"E
145°48'0"E
15°21'0"N
15°18'0"N
15°15'0"N
15°12'0"N
15°9'0"N
15°6'0"N
15°3'0"N
Depth (m)
High: 0
-30
-100
-150
-200
Low: -300
0
3
6
Km
N


145°36'0"E
145°38'0"E
145°40'0"E
145°42'0"E
15°14'0"N
15°12'0"N
15°10'0"N
15°8'0"N
SAIPAN
HARBOR
LAGUNAN GARAPAN
Isleta Mañag
Fl 6s 23m6M
Punta Muchol
Muchol
Fl G 2.5s
6m
Olea
RADIO TOWER
Punta Susupe
Chalan Kanoa
TANKS
Afetña
AERO
Airport
(emergency only)
Punta Agingan
RED
GREEN


Saipan Island, CNMI:
Garapan Anchorage
Multibeam Bathymetry
145°36'0"E
145°39'0"E
145°42'0"E
15°15'0"N
15°12'0"N
15°9'0"N
N
Depth (m)
High: 0
-30
-150
-200
Low: -300
0
2
4
Km


145 30'
145 45'
146 00'
15 15'
15 00'
8-01
8-02
8-03
8-04
8-05
8-06
8-07
8-08
8-09
8-10
8-11
8-12
8-13
8-14
8-15
8-16
8-17
8-18

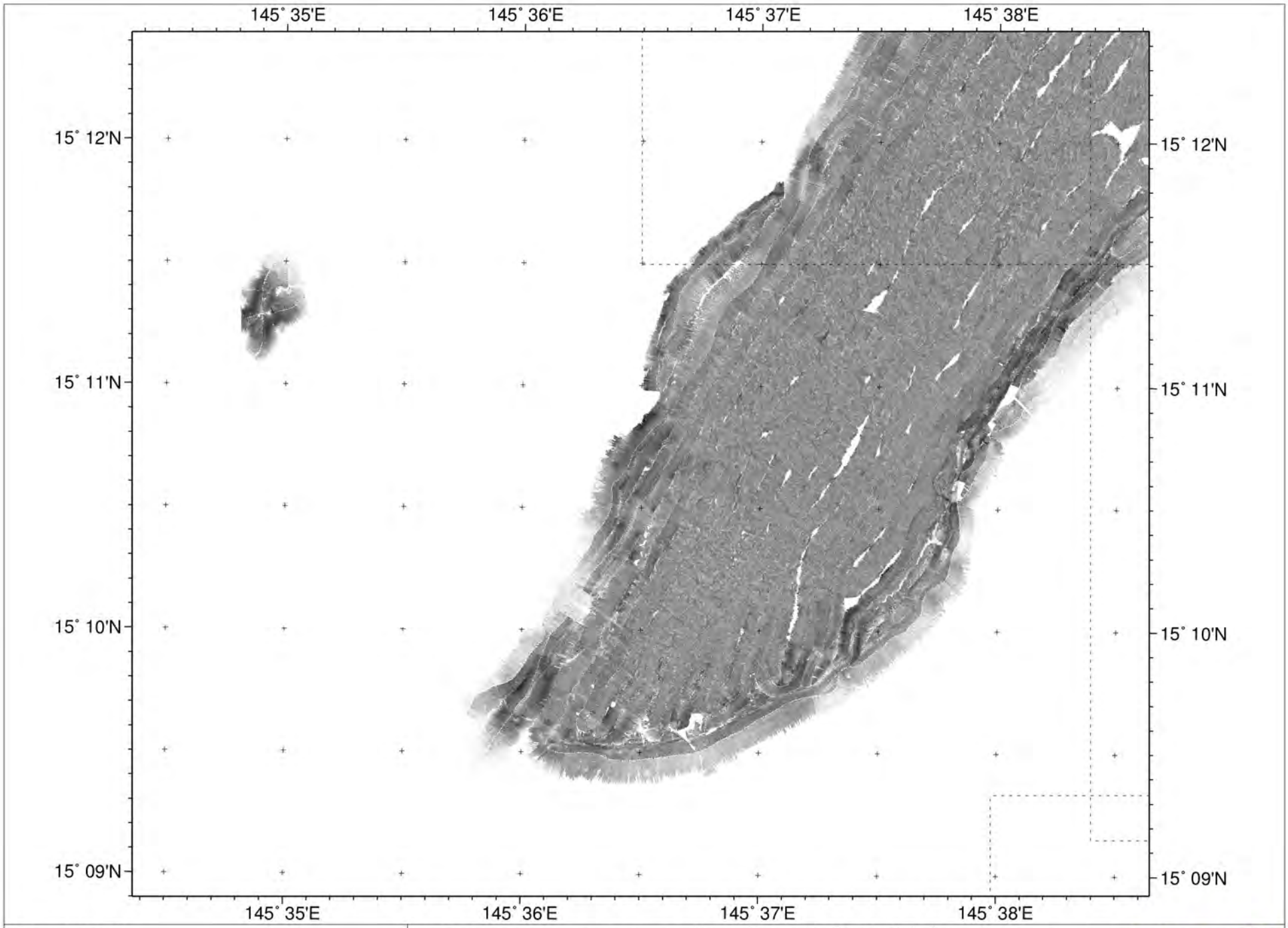


Chart 8-02
Outer Harbor Bank, Saipan

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*

ahi0304 ACOUSTIC IMAGERY

Grid size: 1 m
Coastline: GMT WVS and WDBII database
NOT FOR NAVIGATION

Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55 WGS-84
nautical miles
0 1
0 kilometers 1
Backscatter Magnitude
low high

NOAA CORAL REEF ECOSYSTEM INVESTIGATION
HAWAI'I MAPPING RESEARCH GROUP

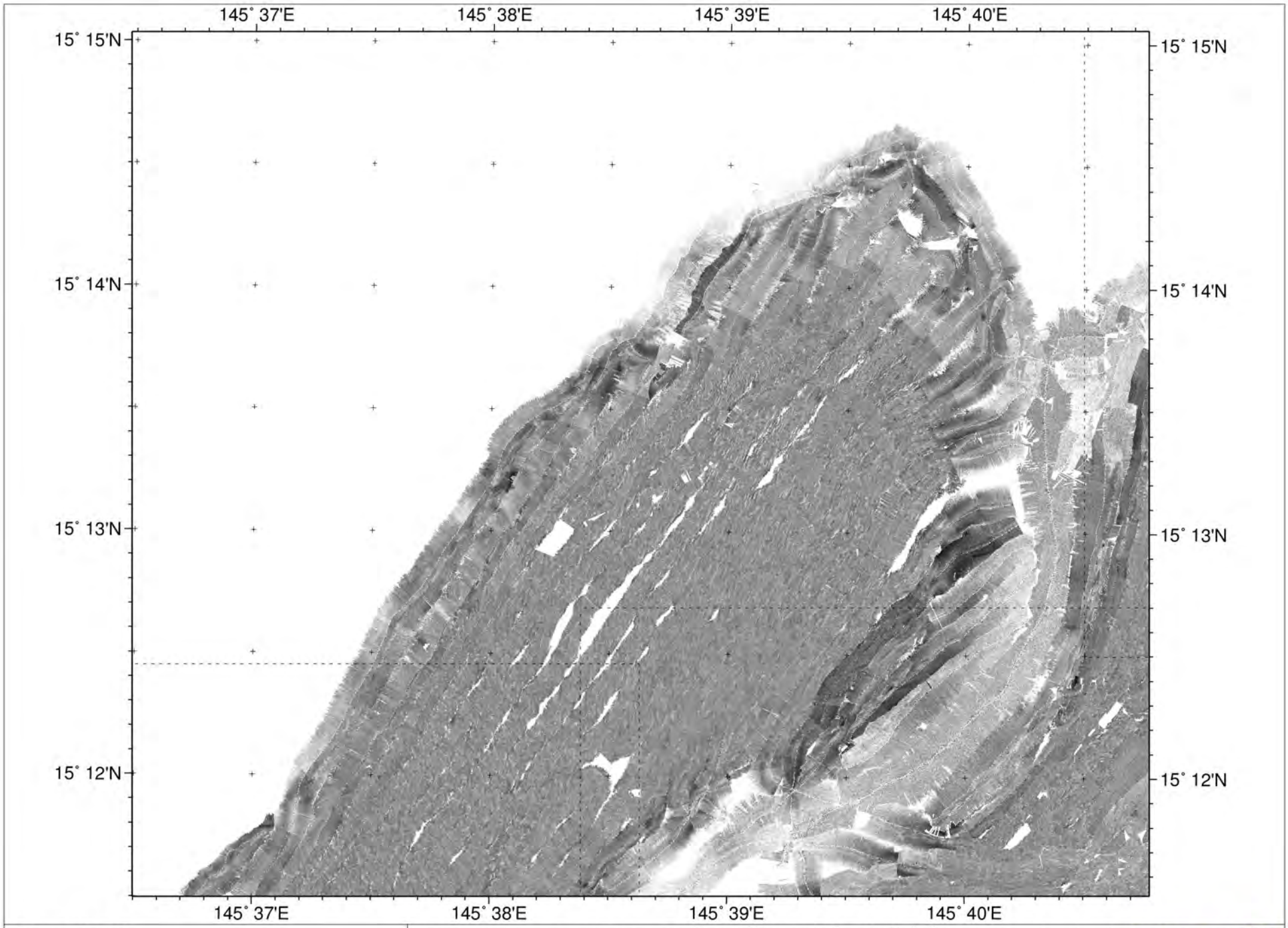


Chart 8-03
Outer Harbor Bank, Saipan

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*

ahi0304 ACOUSTIC IMAGERY

Grid size: 1 m
Coastline: GMT WVS and WDBII database
NOT FOR NAVIGATION

Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55 WGS-84

nautical miles
0 1
kilometers
0 1

Backscatter Magnitude
low high

NOAA CORAL REEF ECOSYSTEM INVESTIGATION
HAWAI'I MAPPING RESEARCH GROUP

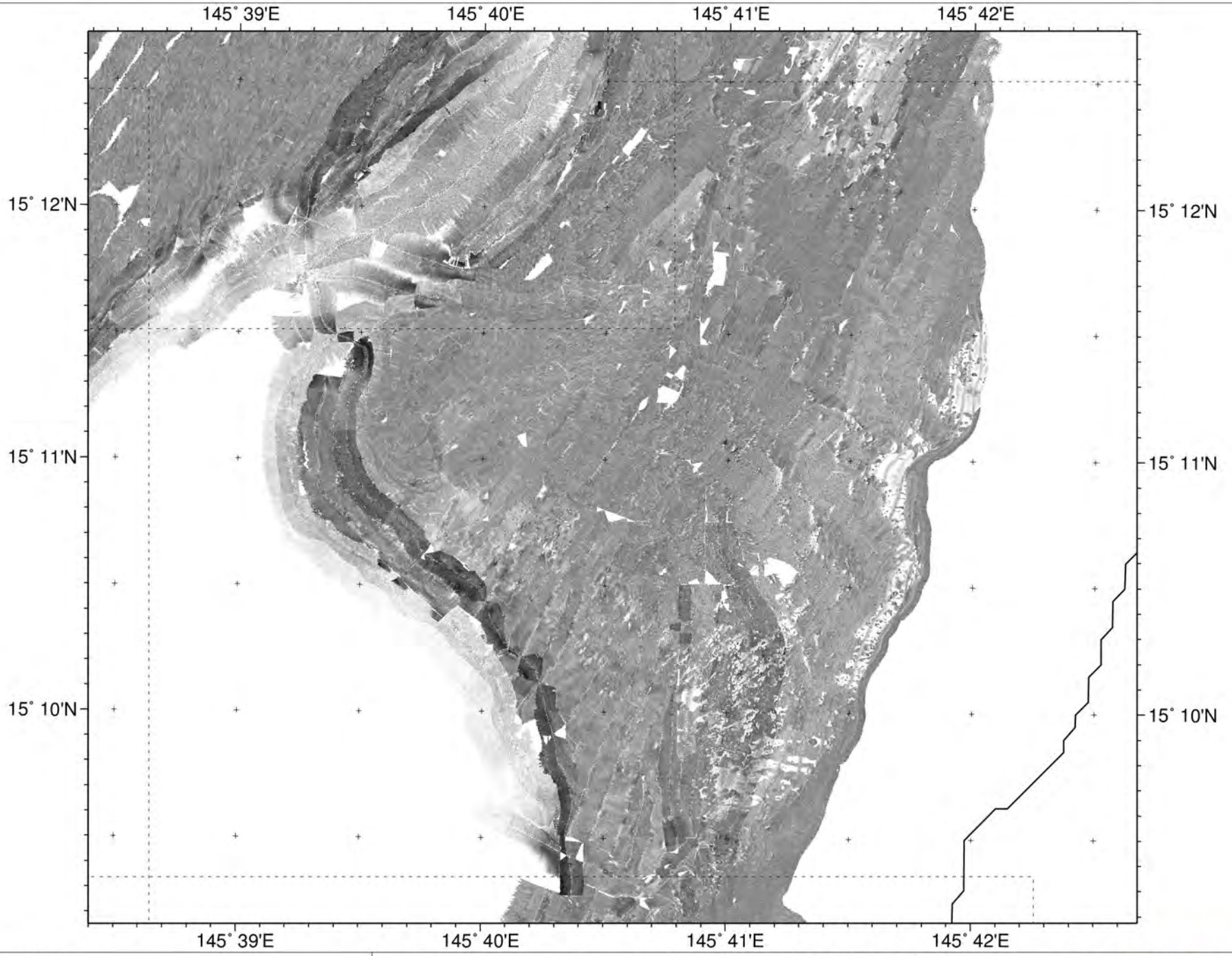


Chart 8-04
Oleai, Saipan

Rusty Brainard (NOAA-CRED)

AUG - SEP 2003 - R/V *AHI*

ahi0304 ACOUSTIC IMAGERY

Grid size: 1 m

Coastline: GMT WVS and WDBII database

NOT FOR NAVIGATION

Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55 WGS-84

nautical miles
0 1
kilometers
0 1

Backscatter Magnitude
low high

NOAA CORAL REEF ECOSYSTEM INVESTIGATION

HAWAI'I MAPPING RESEARCH GROUP

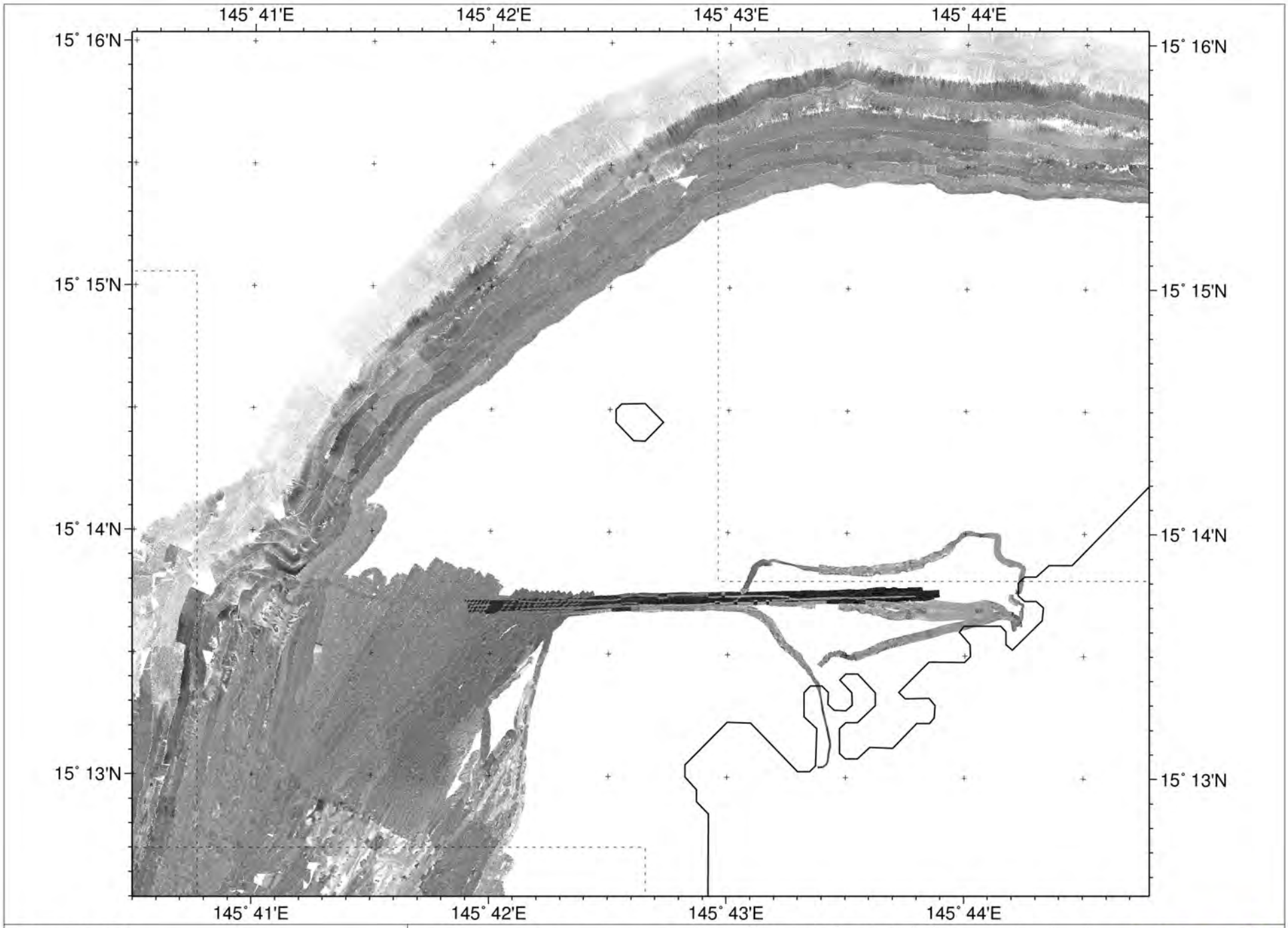


Chart 8-05
Isleta Managaha, Saipan

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*

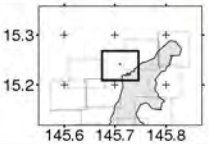
ahi0304 ACOUSTIC IMAGERY

Grid size: 1 m
Coastline: GMT WVS and WDBII database
NOT FOR NAVIGATION

Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55 WGS-84

nautical miles
0 1
kilometers
0 1

Backscatter Magnitude
low high



NOAA CORAL REEF ECOSYSTEM INVESTIGATION
HAWAI'I MAPPING RESEARCH GROUP

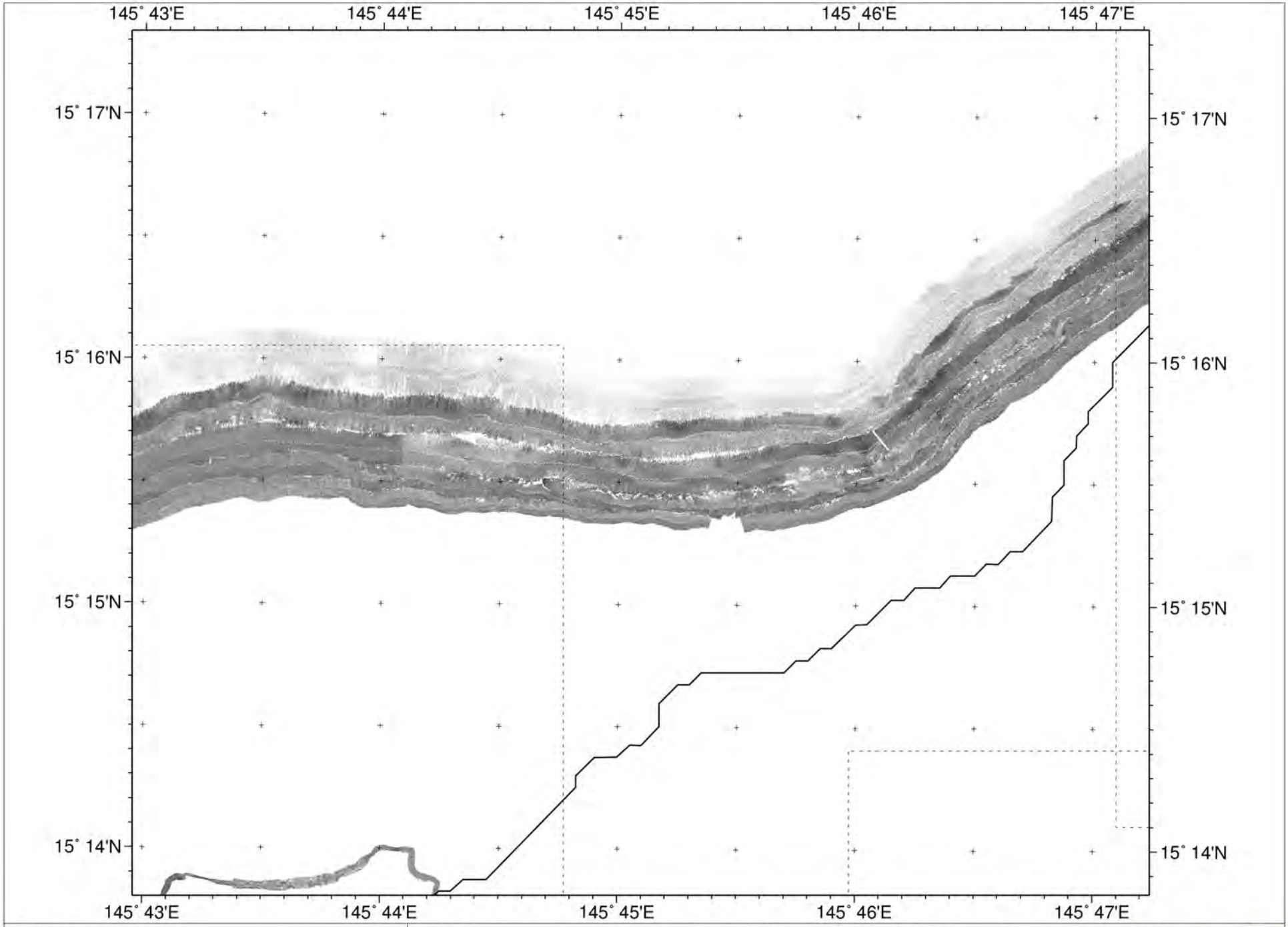


Chart 8-06
Tanapag, Saipan

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*

ahi0304 ACOUSTIC IMAGERY

Grid size: 1 m
Coastline: GMT WVS and WDBII database
NOT FOR NAVIGATION

Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55 WGS-84
nautical miles
0 1
0 kilometers 1
Backscatter Magnitude
low high

15.3
15.2
145.6 145.7 145.8 145.9

NOAA CORAL REEF ECOSYSTEM INVESTIGATION
HAWAI'I MAPPING RESEARCH GROUP

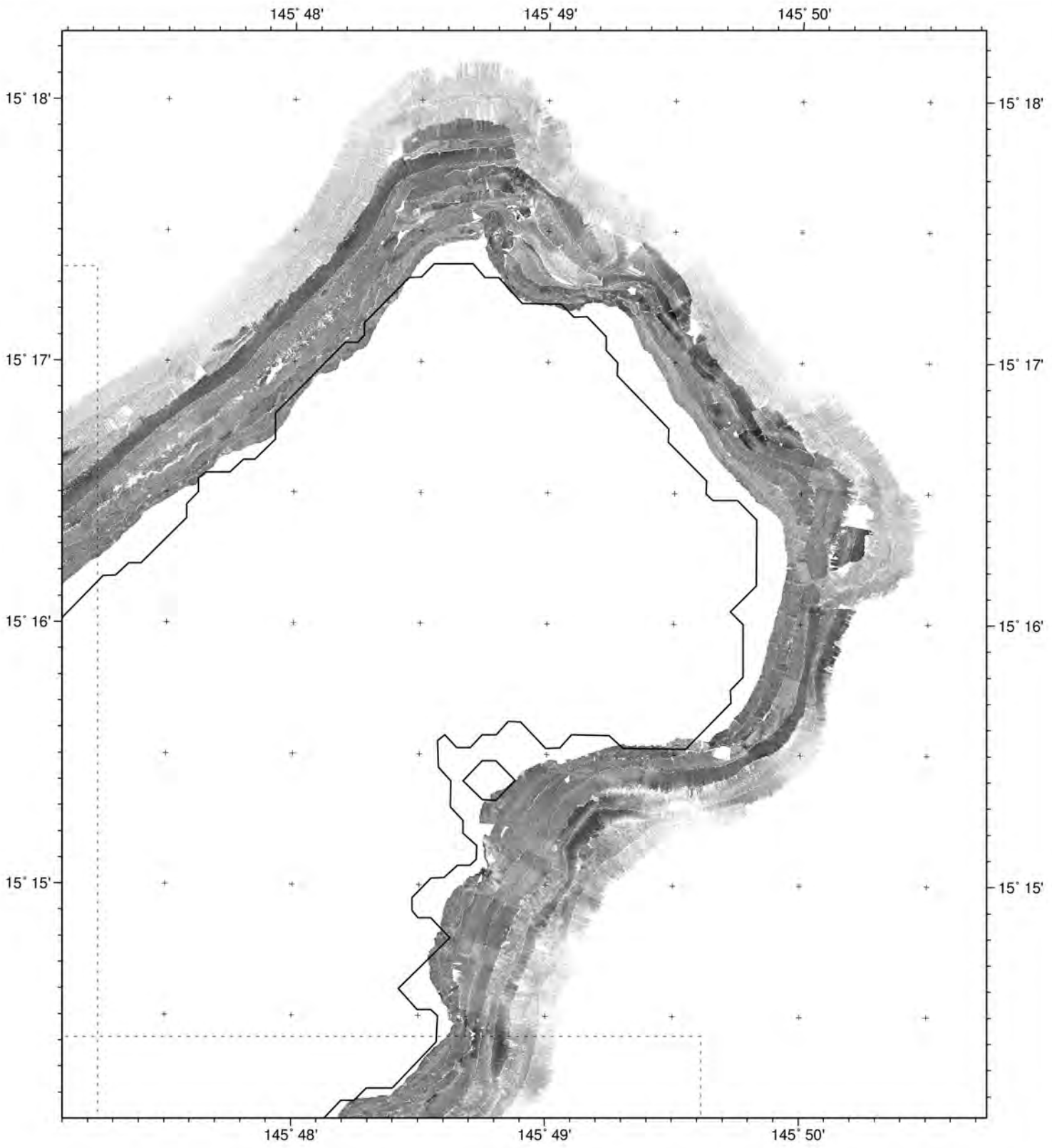


Chart 8-07

Puntan Sabaneta, Saipan
ahi0304 ACOUSTIC IMAGERY

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*
NOT FOR Navigation

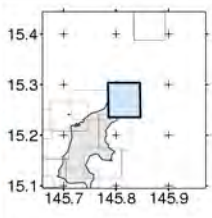
Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55
nautical miles
0 0 kilometers 1 1

low Backscatter Magnitude high

Grid size: 1 m Ellipsoid: WGS-84
Elipsoid: WGS-84
Equipment: POS-MV CA-GPS
Coastline: GMT WVS and WDBII database

NOAA CORAL REEF ECOSYSTEM INVESTIGATION

HAWAI'I MAPPING RESEARCH GROUP



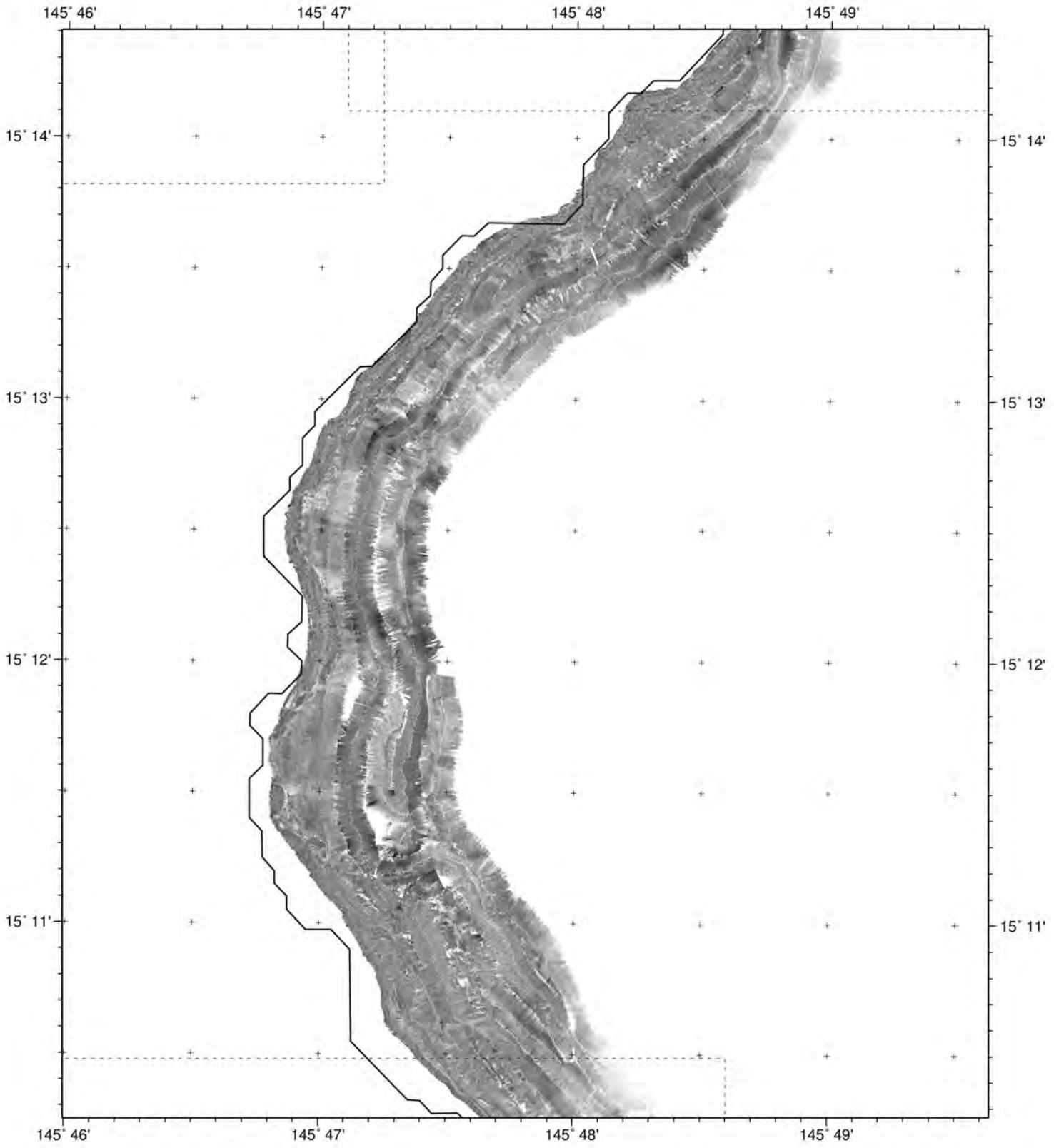


Chart 8-08

Puntan Gloria, Saipan
ahi0304 ACOUSTIC IMAGERY

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*
NOT FOR Navigation

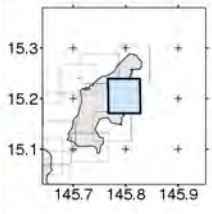
Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55
nautical miles
0 1
0 kilometers 1

low Backscatter Magnitude high

Grid size: 1 m
Elipsoid: WGS-84
Equipment: POS-MV CA-GPS
Coastline: GMT WVS and WDBII database

NOAA CORAL REEF ECOSYSTEM INVESTIGATION

HAWAI'I MAPPING RESEARCH GROUP



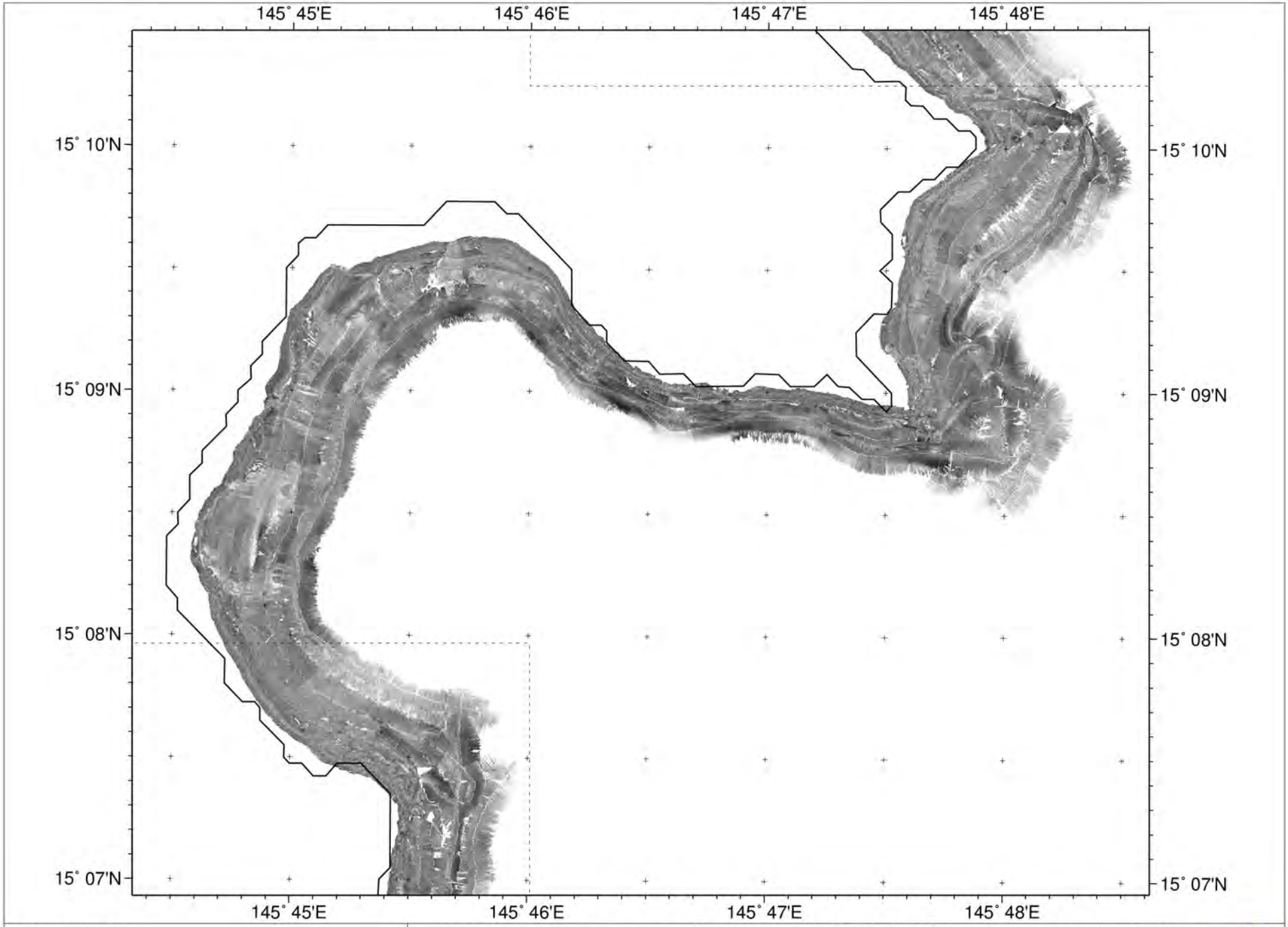


Chart 8-09
Bahia Laulau, Saipan

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*

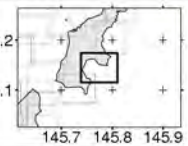
ahi0304 ACOUSTIC IMAGERY

Grid size: 1 m
Coastline: GMT WVS and WDBII database
NOT FOR NAVIGATION

Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55 WGS-84

nautical miles
0 1
kilometers
0 1

Backscatter Magnitude
low high



NOAA CORAL REEF ECOSYSTEM INVESTIGATION

HAWAI'I MAPPING RESEARCH GROUP

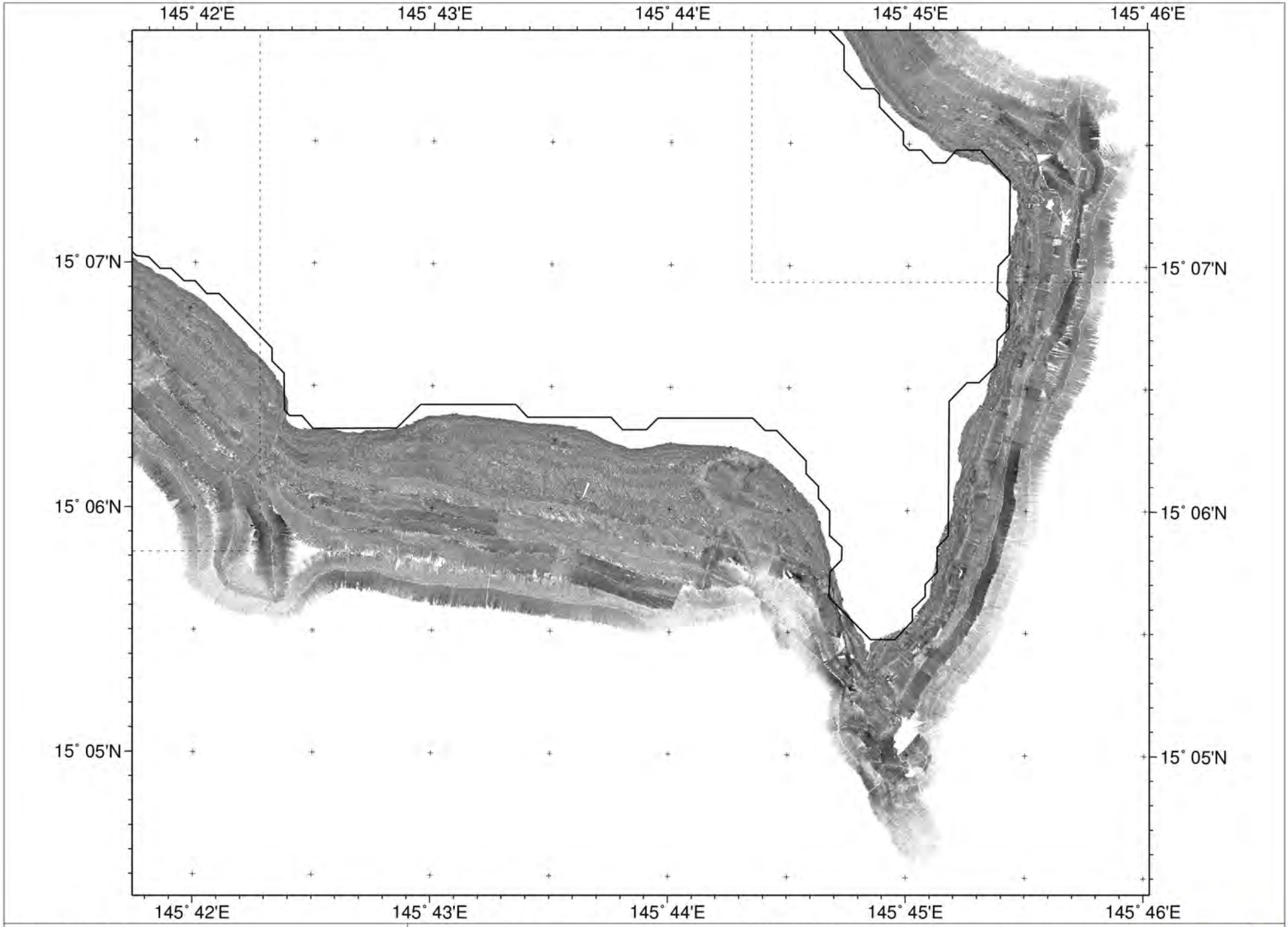


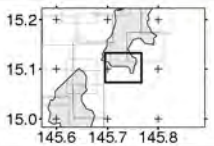
Chart 8-10
Puntan I Naftan, Saipan

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*

ahi0304 ACOUSTIC IMAGERY

Grid size: 1 m
Coastline: GMT WVS and WDBII database
NOT FOR NAVIGATION

Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55 WGS-84
nautical miles
0 1
0 kilometers 1
Backscatter Magnitude
low high



NOAA CORAL REEF ECOSYSTEM INVESTIGATION
HAWAI'I MAPPING RESEARCH GROUP

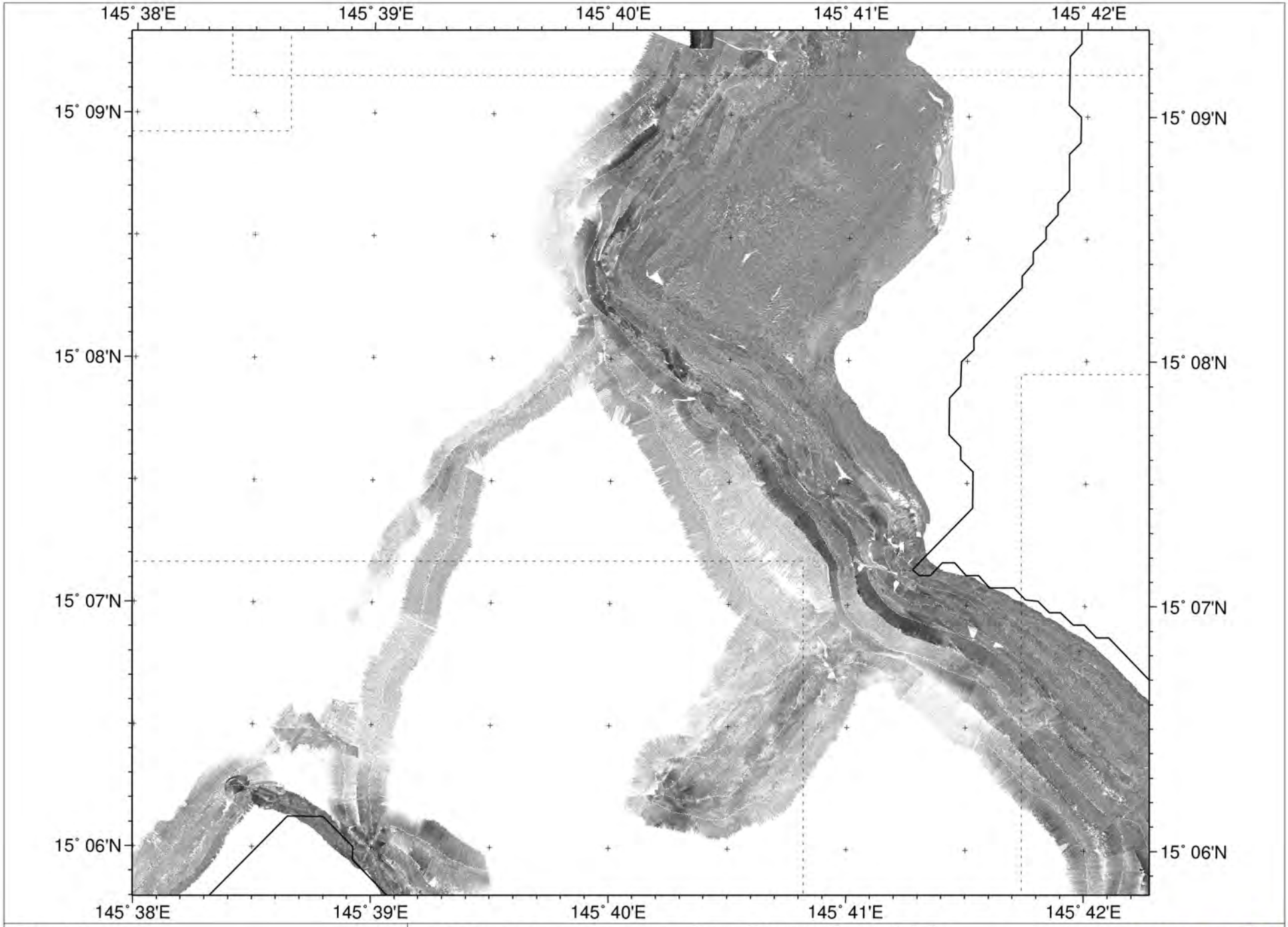


Chart 8-11
Puntan Agingan, Saipan

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*

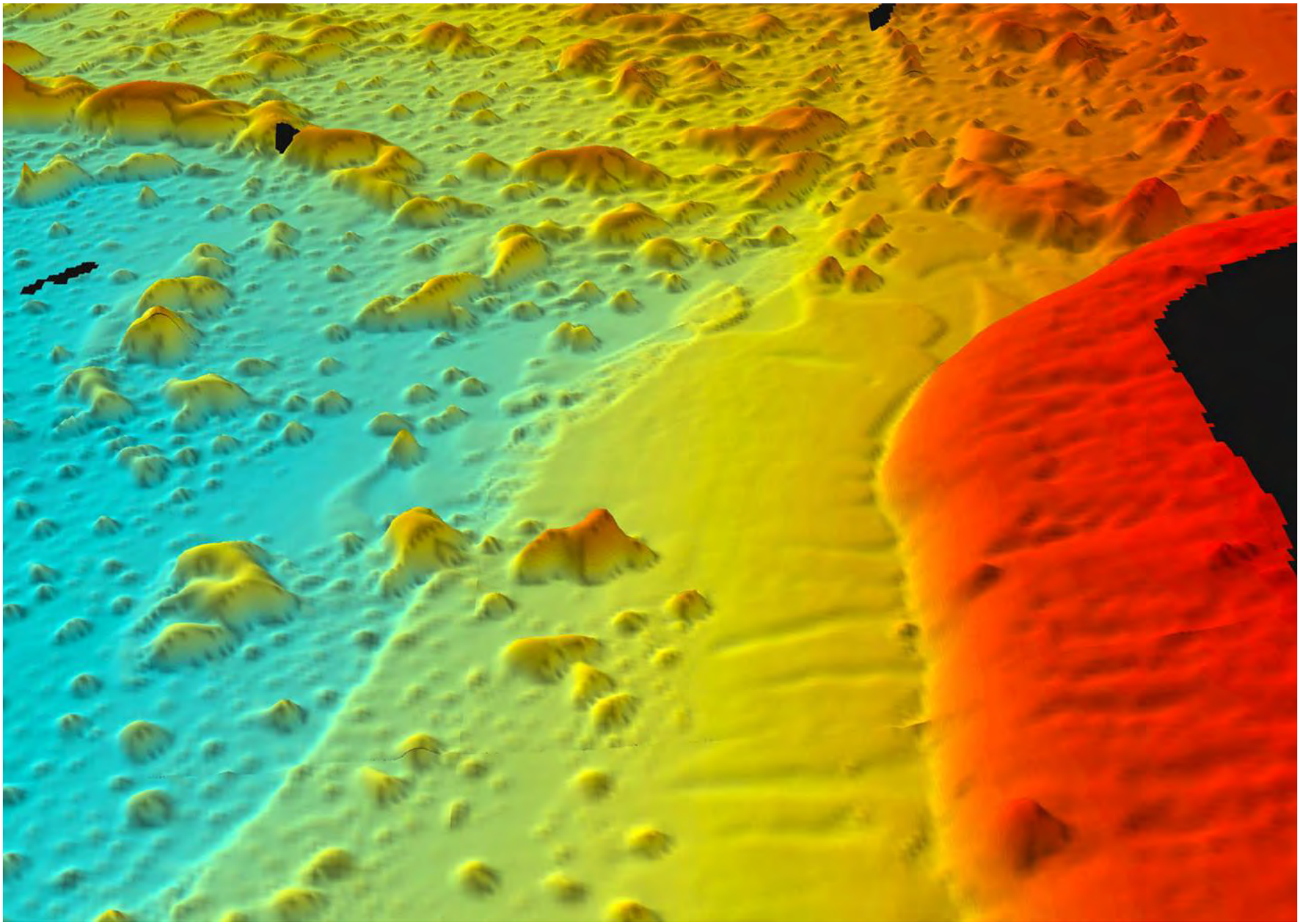
ahi0304 ACOUSTIC IMAGERY

Grid size: 1 m
Coastline: GMT WVS and WDBII database
NOT FOR NAVIGATION

Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55 WGS-84
nautical miles
0 1
0 kilometers 1
Backscatter Magnitude
low high

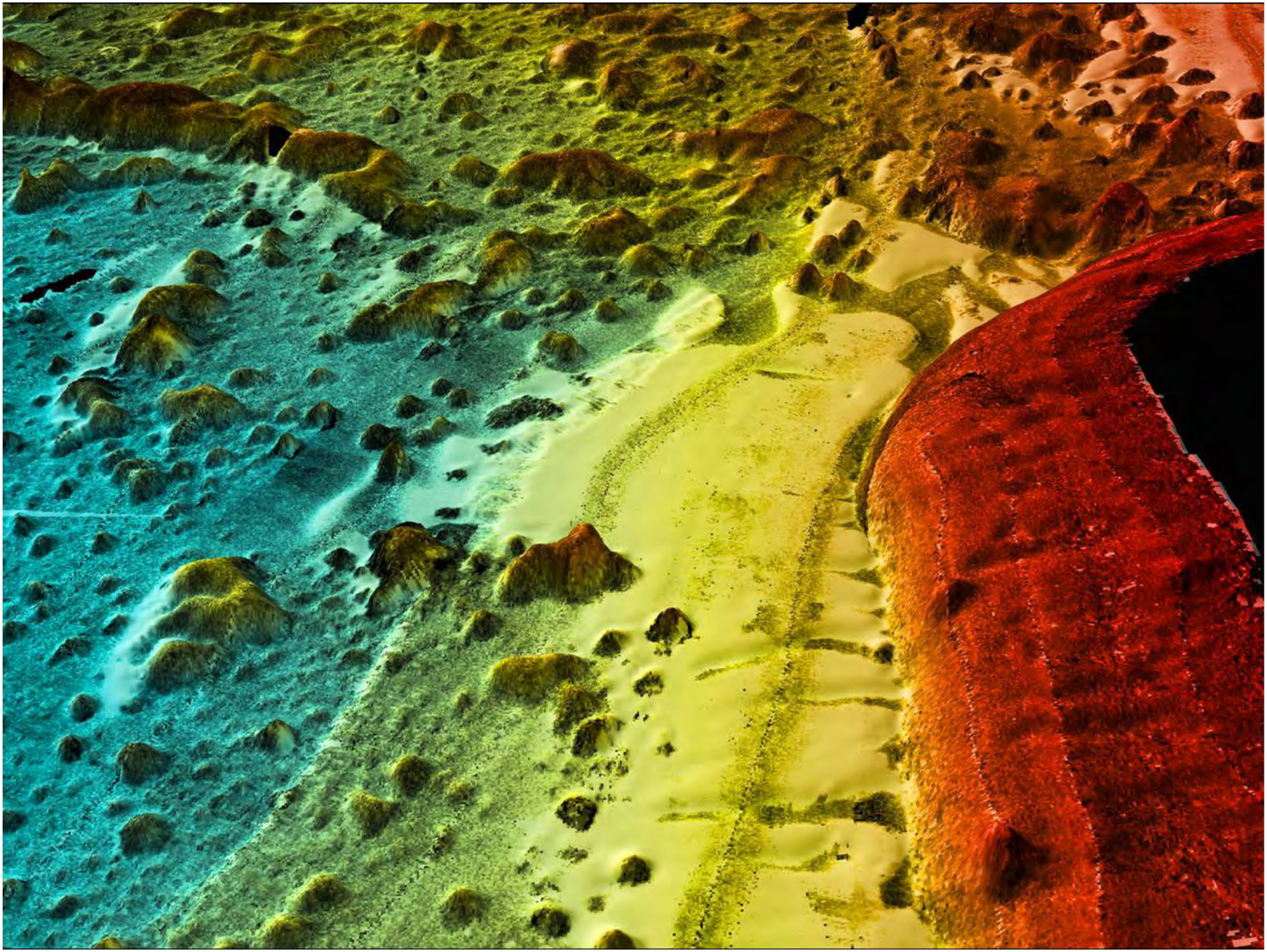
15.2
15.1
145.6 145.7 145.8

NOAA CORAL REEF ECOSYSTEM INVESTIGATION
HAWAI'I MAPPING RESEARCH GROUP



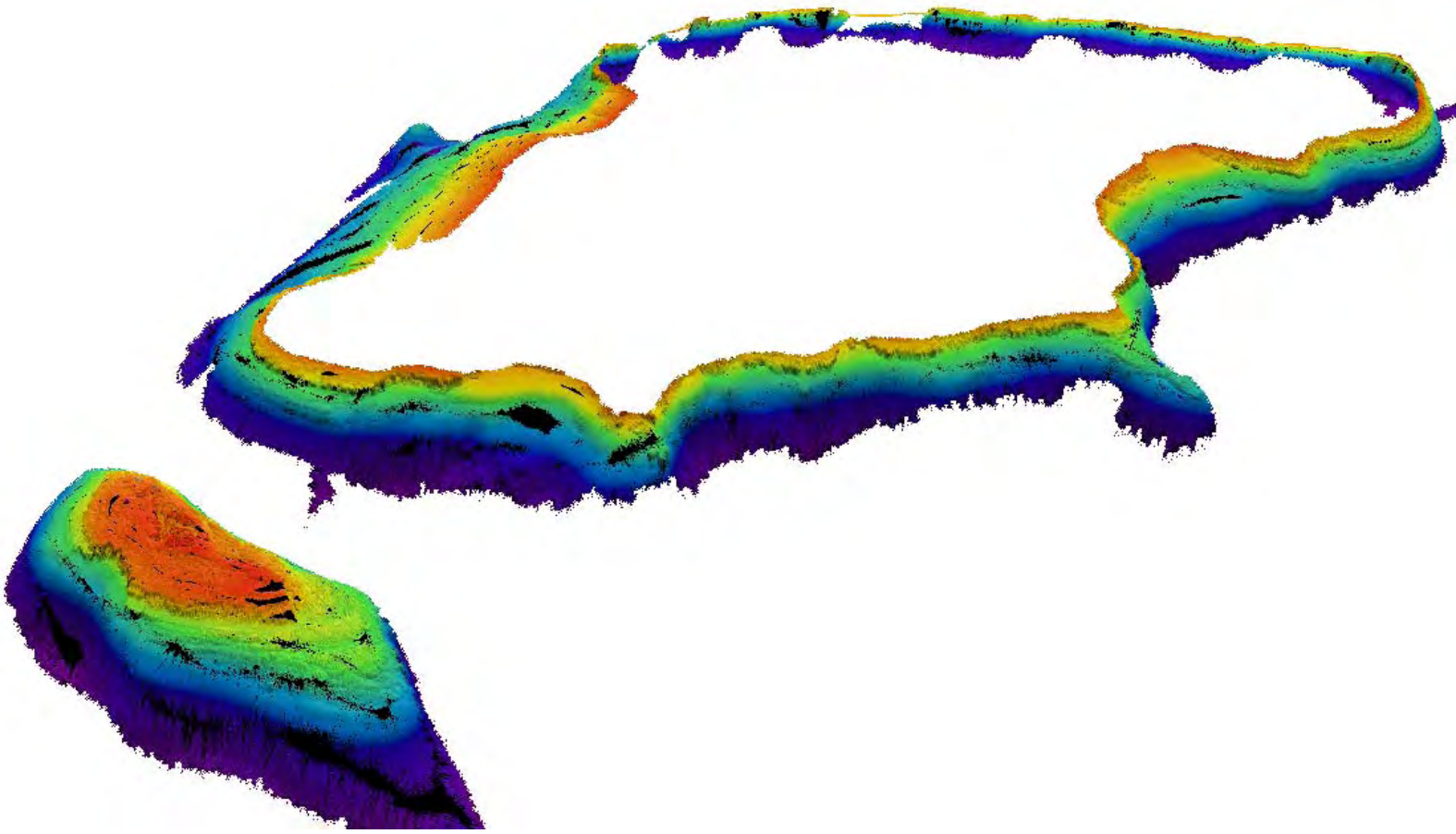
3D perspective of multibeam bathymetry where reds are shallow and blues are deeper. Saipan Anchorage 2003

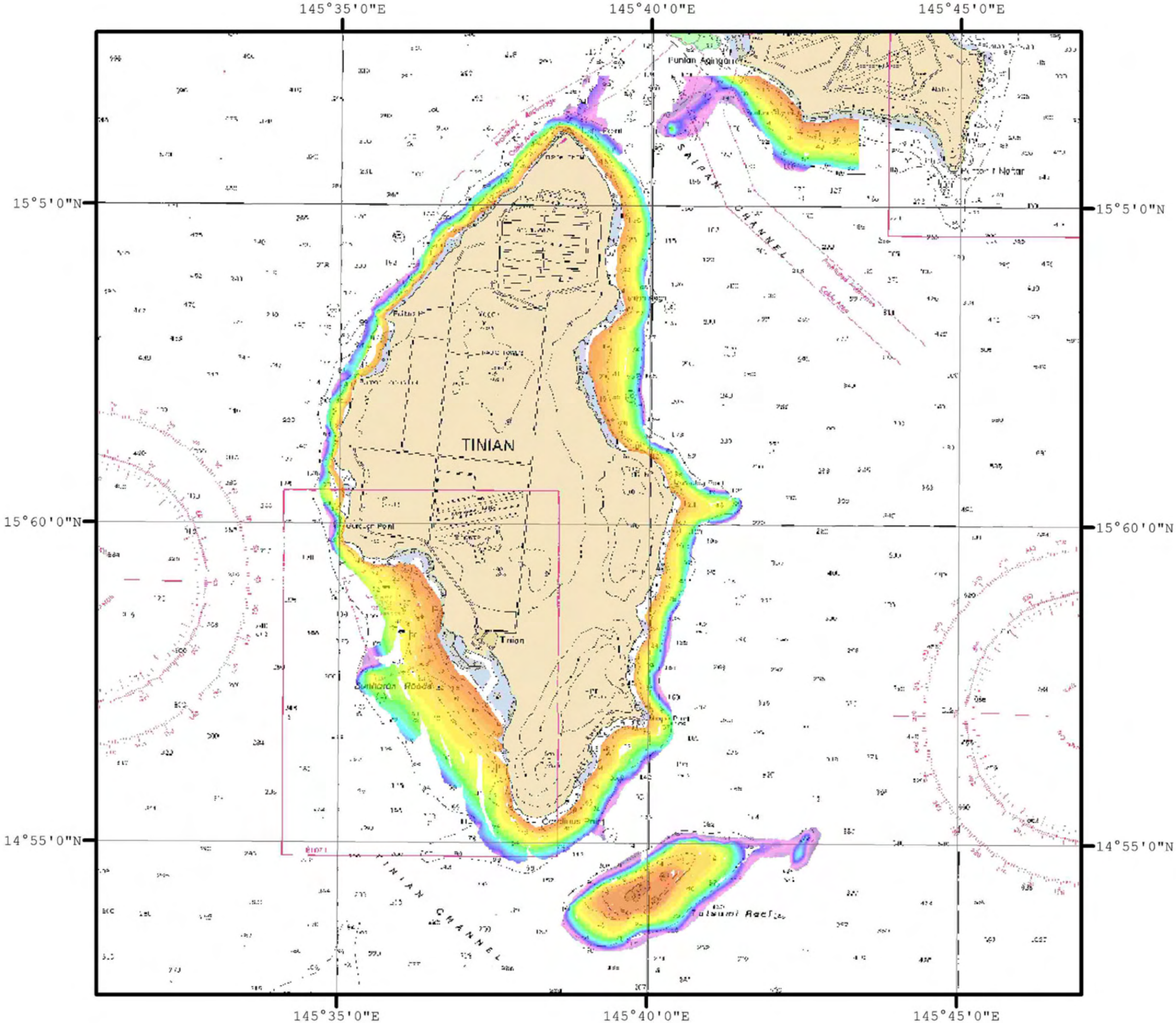
3D perspective of multibeam backscatter imagery where white is low intensity return (softbottom) and black is high intensity return (hardbottom). Saipan Anchorage 2003

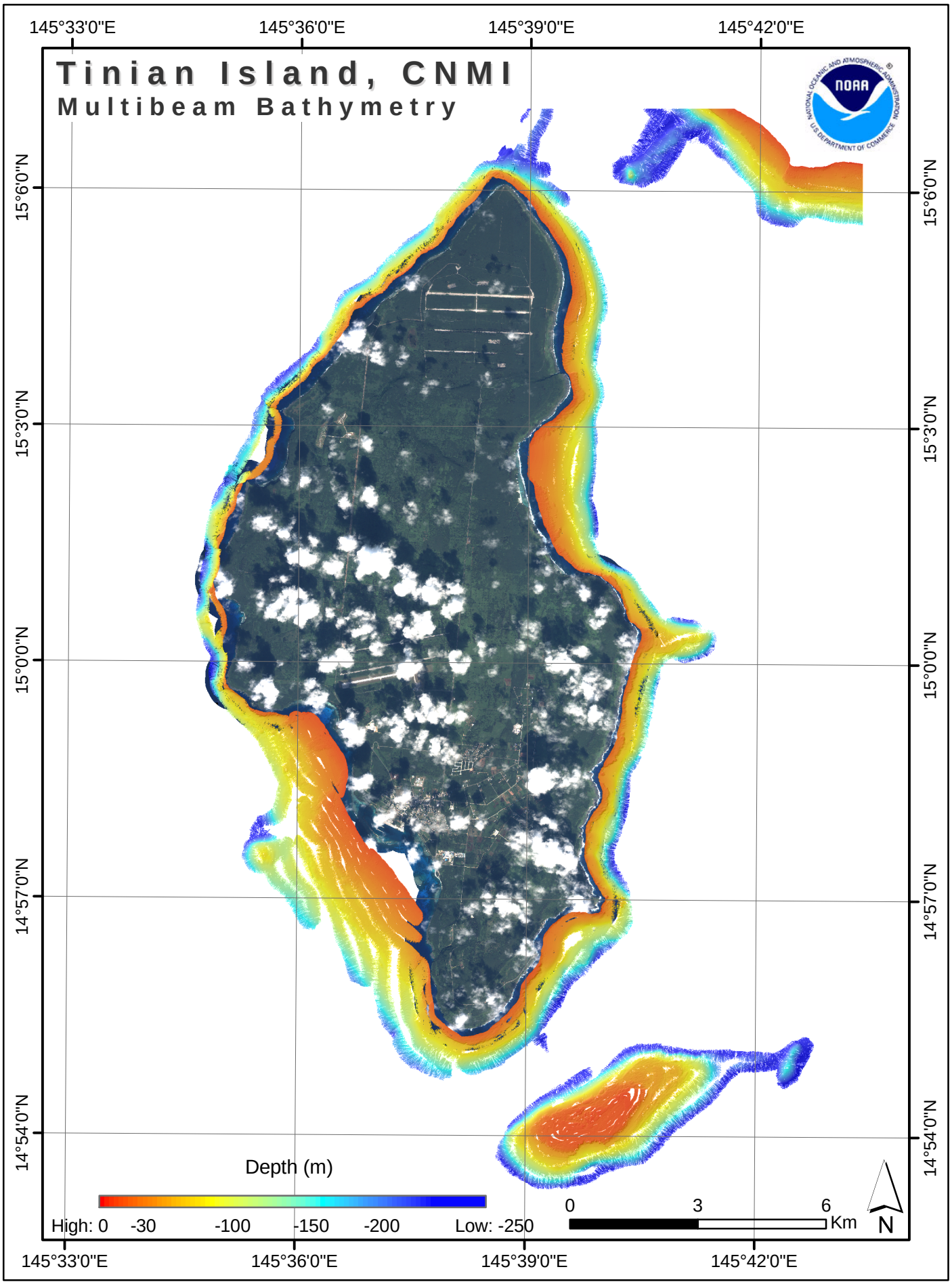


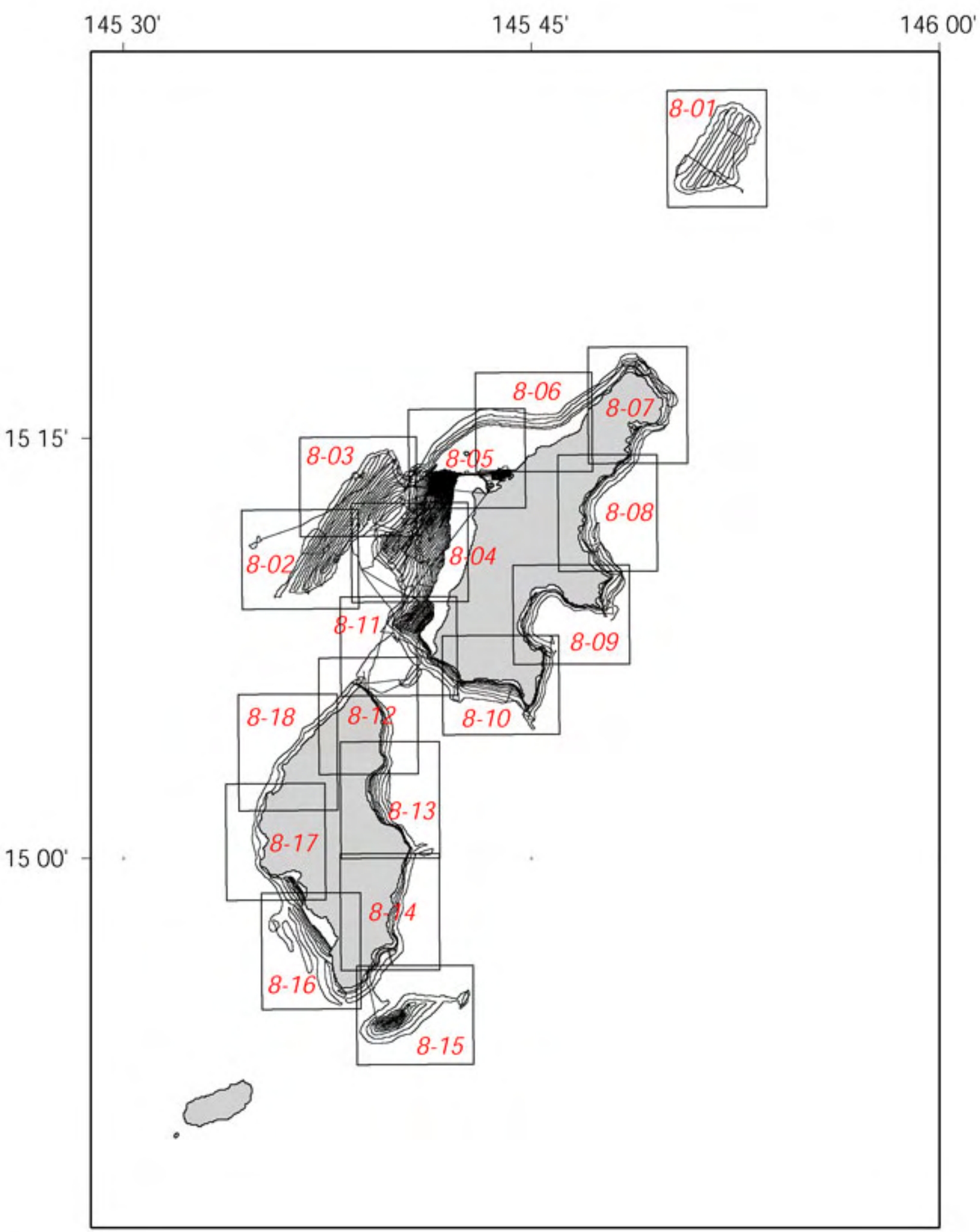
3D perspective of multibeam bathymetry draped over backscatter imagery where red is shallow and blues are deeper; light shading is low intensity return (softbottom) and dark shading is high intensity return (hardbottom). Saipan Anchorage 2003

Tinian & Tatsumi




145°35'0"E
145°40'0"E
145°45'0"E
15°5'0"N
15°60'0"N
14°55'0"N
TINIAN
Tinian
SAIPAN CHANNEL
TINIAN CHANNEL
Tatsumi Reef


Tinian Island, CNMI
Multibeam Bathymetry
145°33'0"E
145°36'0"E
145°39'0"E
145°42'0"E
15°6'0"N
15°3'0"N
15°0'0"N
14°57'0"N
14°54'0"N
Depth (m)
High: 0
-30
-100
-150
-200
Low: -250
0
3
6
Km
N


145 30'
145 45'
146 00'
15 15'
15 00'
8-01
8-02
8-03
8-04
8-05
8-06
8-07
8-08
8-09
8-10
8-11
8-12
8-13
8-14
8-15
8-16
8-17
8-18

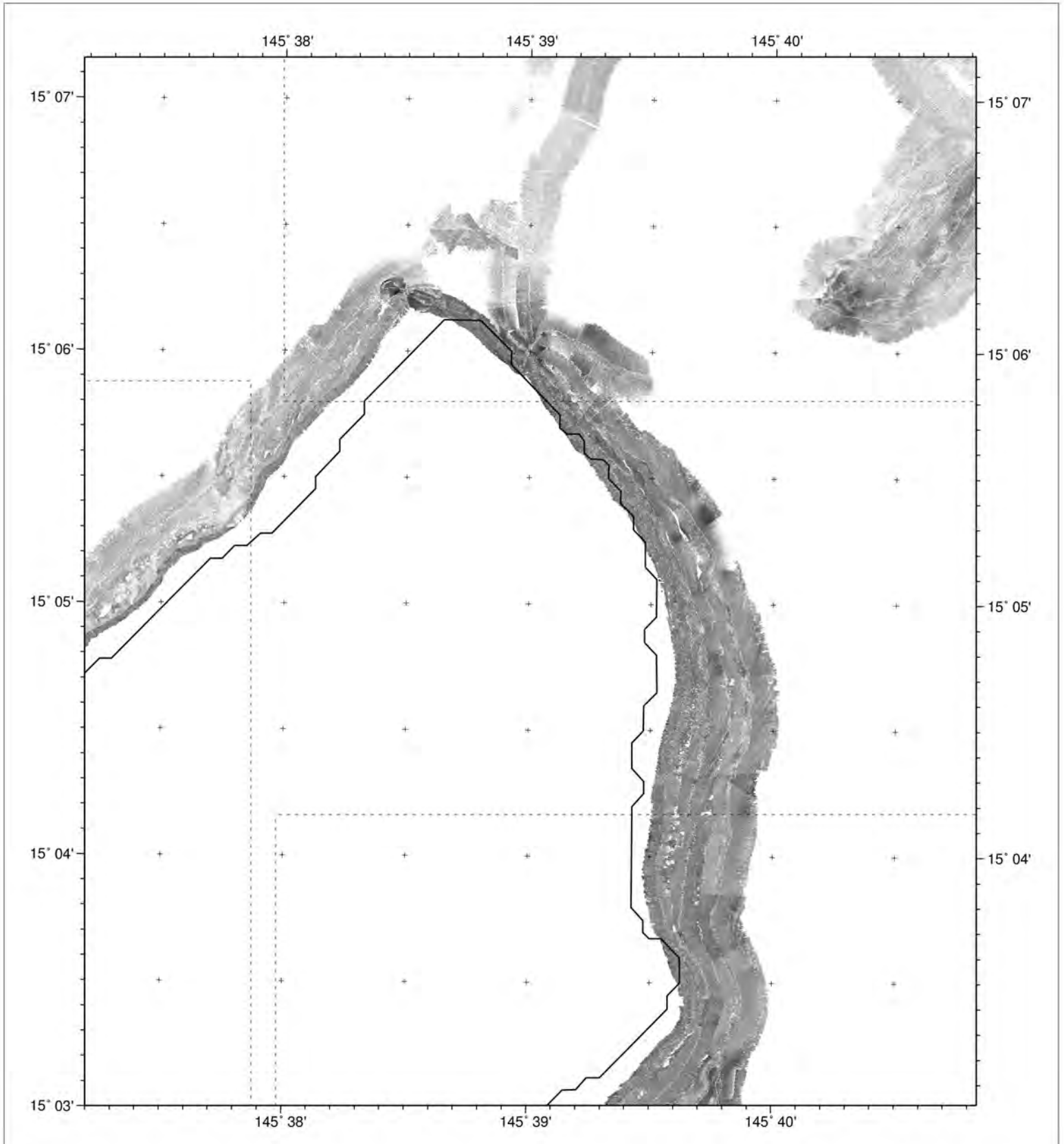


Chart 8-12

Tinian
ahi0304 ACOUSTIC IMAGERY

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*
NOT FOR Navigation

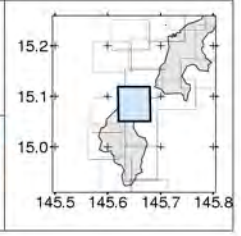
Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55
nautical miles
0 0 kilometers 1 1

low Backscatter Magnitude high

Grid size: 1 m
Elipsoid: WGS-84
Equipment: POS-MV CA-GPS
Coastline: GMT WVS and WDBII database

NOAA CORAL REEF ECOSYSTEM INVESTIGATION

HAWAI'I MAPPING RESEARCH GROUP



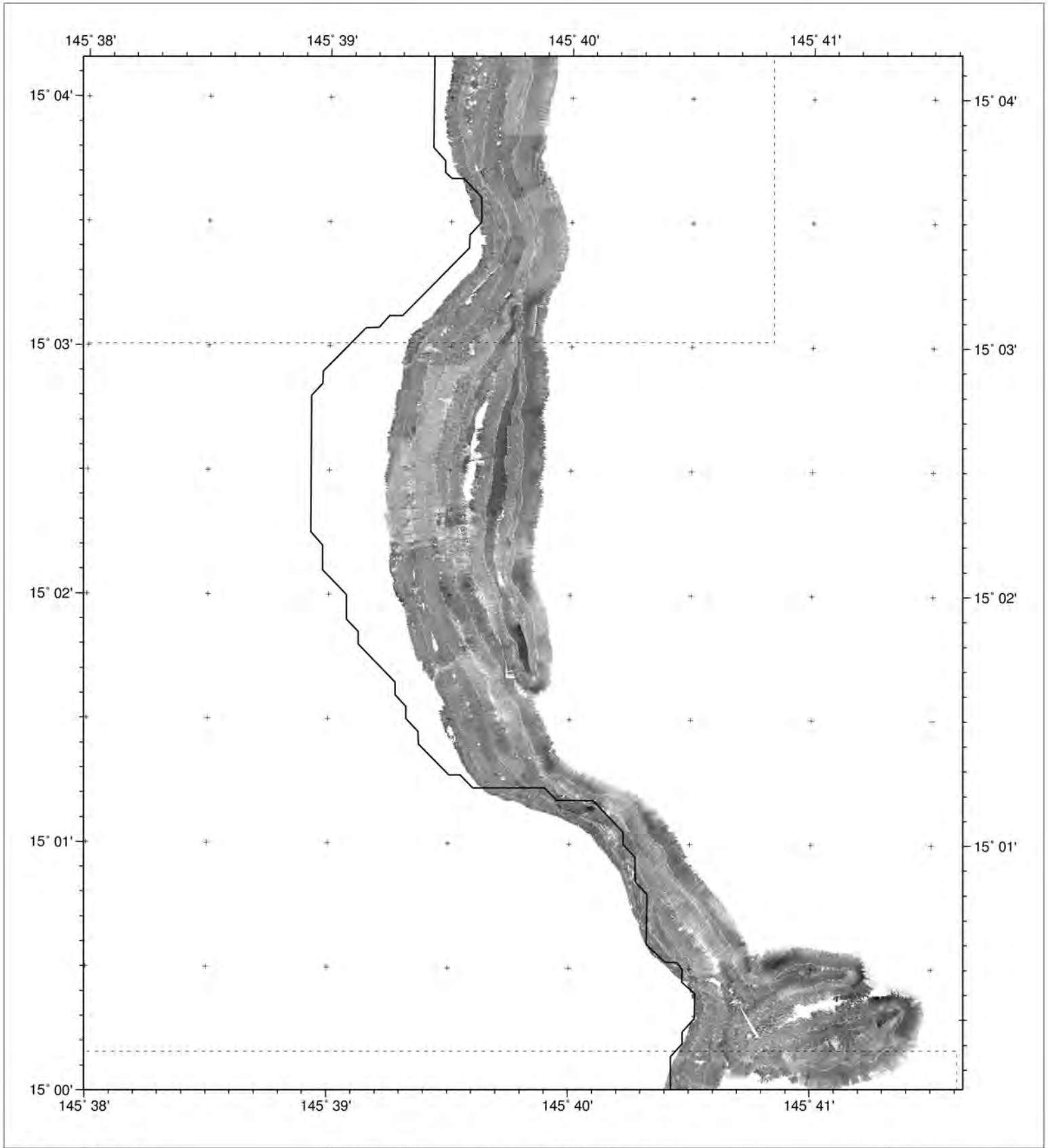


Chart 8-13

Tinian
ahi0304 ACOUSTIC IMAGERY

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*
NOT FOR Navigation

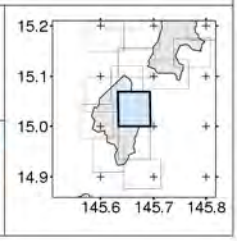
Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55
nautical miles
0 0 kilometers 1 1

low Backscatter Magnitude high

Grid size: 1 m
Elipsoid: WGS-84
Equipment: POS-MV CA-GPS
Coastline: GMT WVS and WDBII database

NOAA CORAL REEF ECOSYSTEM INVESTIGATION

HAWAI'I MAPPING RESEARCH GROUP



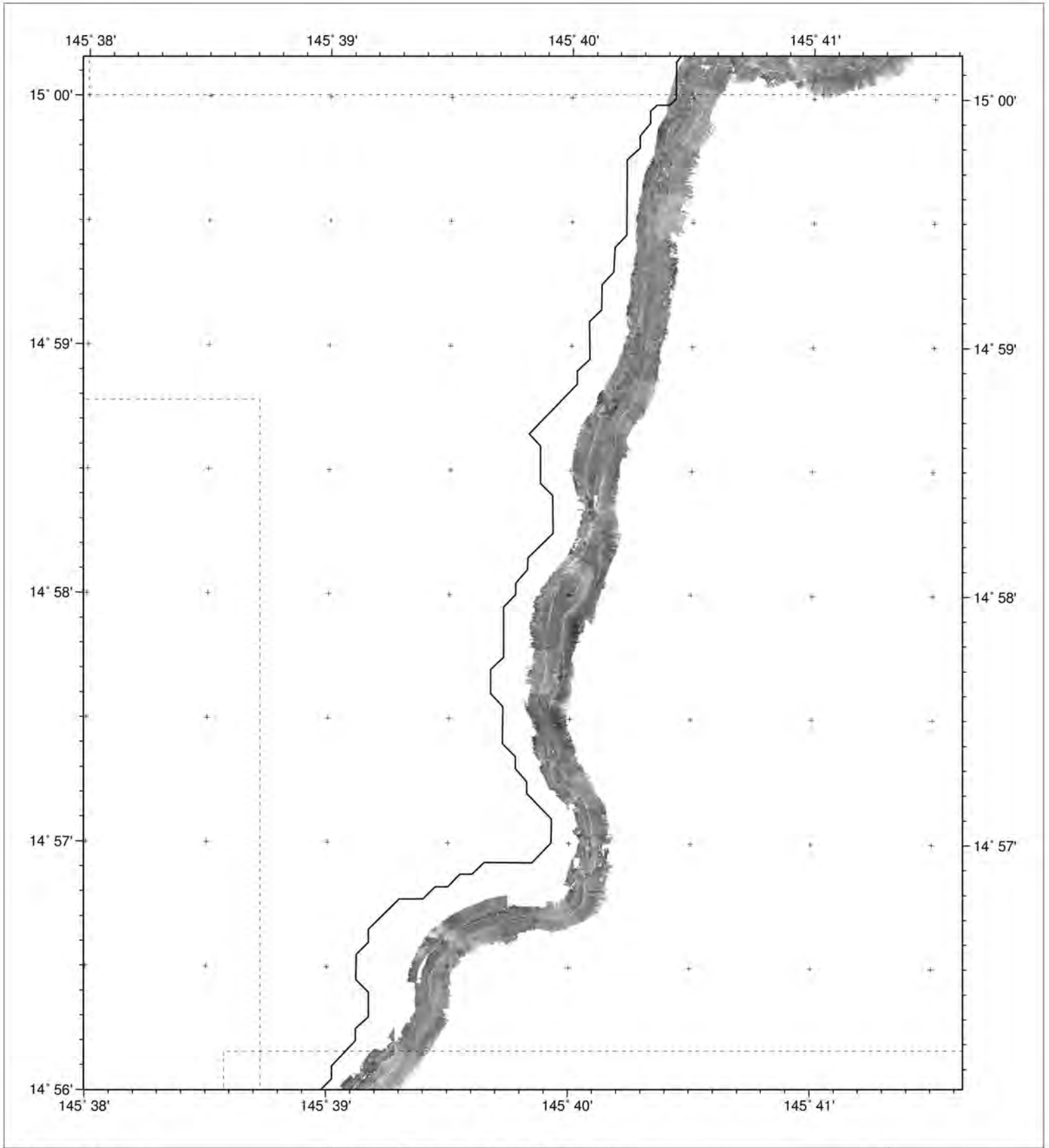


Chart 8-14

Tinian
ahi0304 ACOUSTIC IMAGERY

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*
NOT FOR Navigation

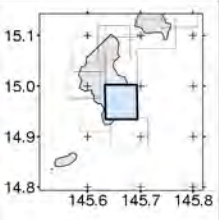
Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55
nautical miles
0 0 kilometers 1 1

low Backscatter Magnitude high

Grid size: 1 m
Elipsoid: WGS-84
Equipment: POS-MV CA-GPS
Coastline: GMT WVS and WDBII database

NOAA CORAL REEF ECOSYSTEM INVESTIGATION

HAWAI'I MAPPING RESEARCH GROUP



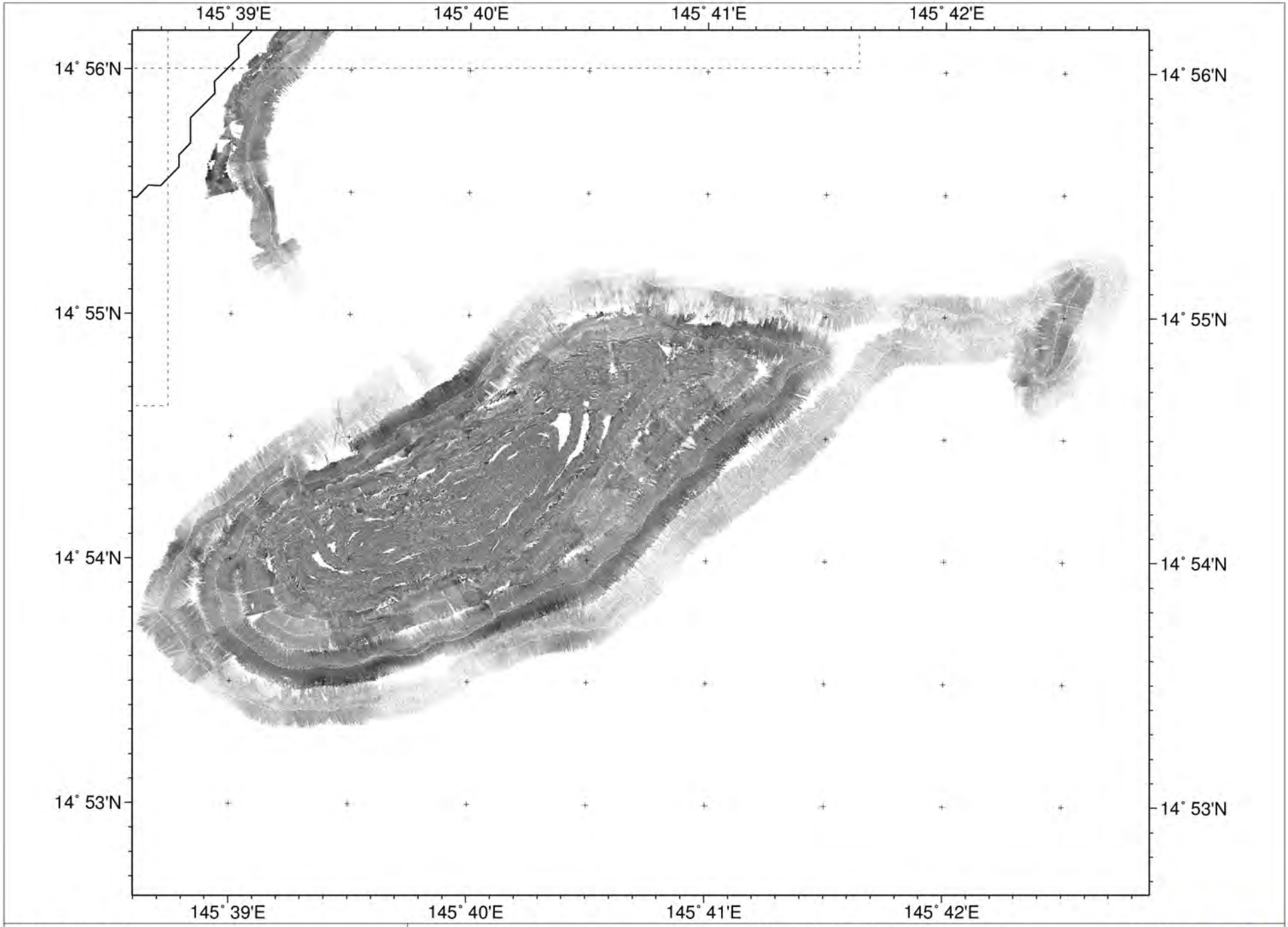


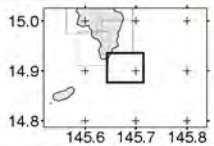
Chart 8-15
Tinian

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*

ahi0304 ACOUSTIC IMAGERY

Grid size: 1 m
Coastline: GMT WVS and WDBII database
NOT FOR NAVIGATION

Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55 WGS-84
nautical miles
0 1
0 kilometers 1
Backscatter Magnitude
low high



NOAA CORAL REEF ECOSYSTEM INVESTIGATION
HAWAI'I MAPPING RESEARCH GROUP

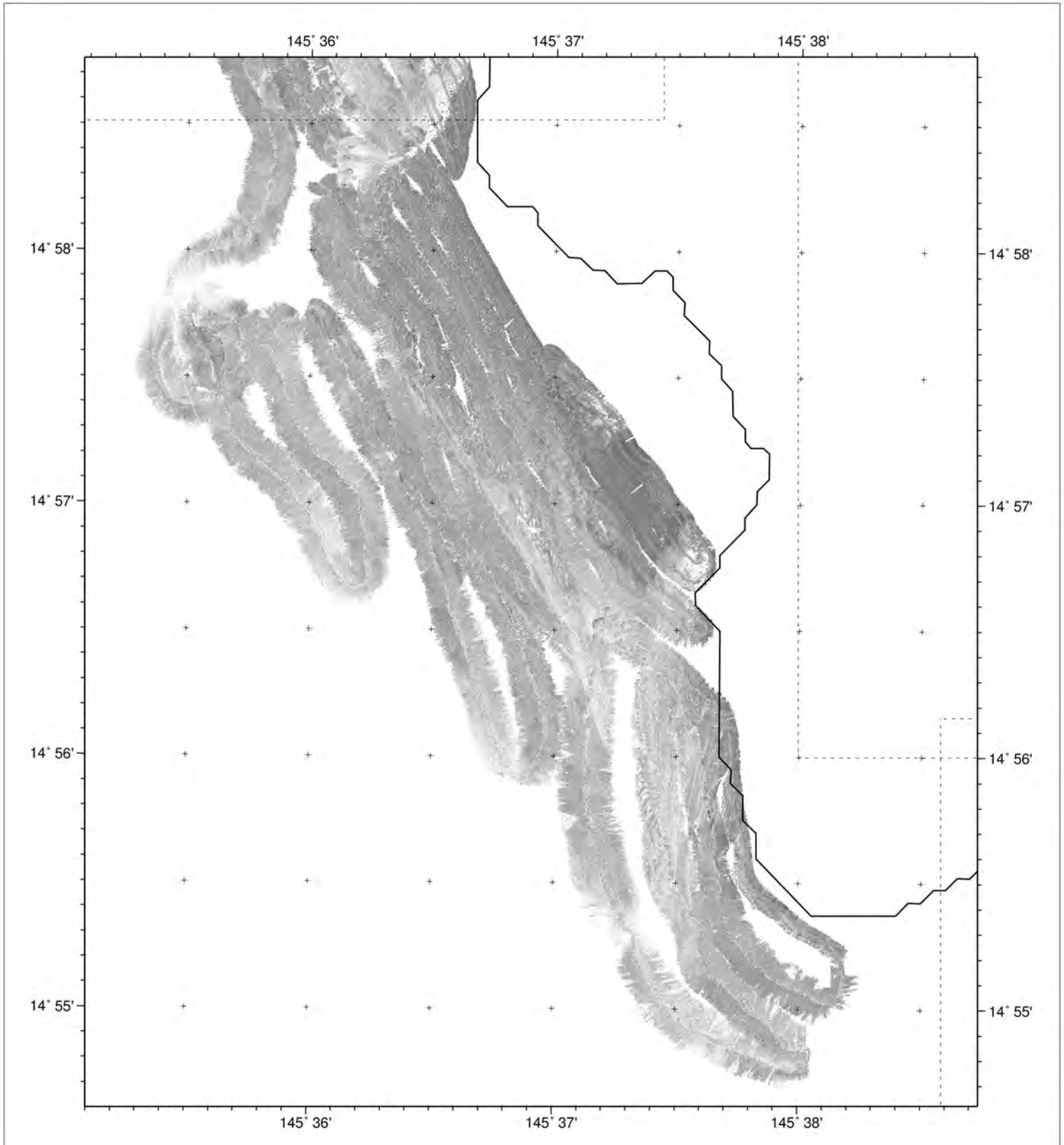


Chart 8-16

Tinian
ahi0304 ACOUSTIC IMAGERY

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*
NOT FOR Navigation

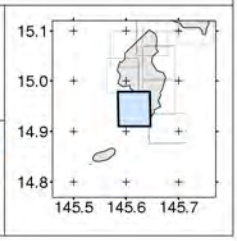
Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55
nautical miles
0 0 kilometers 1 1

low Backscatter Magnitude high

Grid size: 1 m
Elipsoid: WGS-84
Equipment: POS-MV CA-GPS
Coastline: GMT WVS and WDBII database

NOAA CORAL REEF ECOSYSTEM INVESTIGATION

HAWAI'I MAPPING RESEARCH GROUP



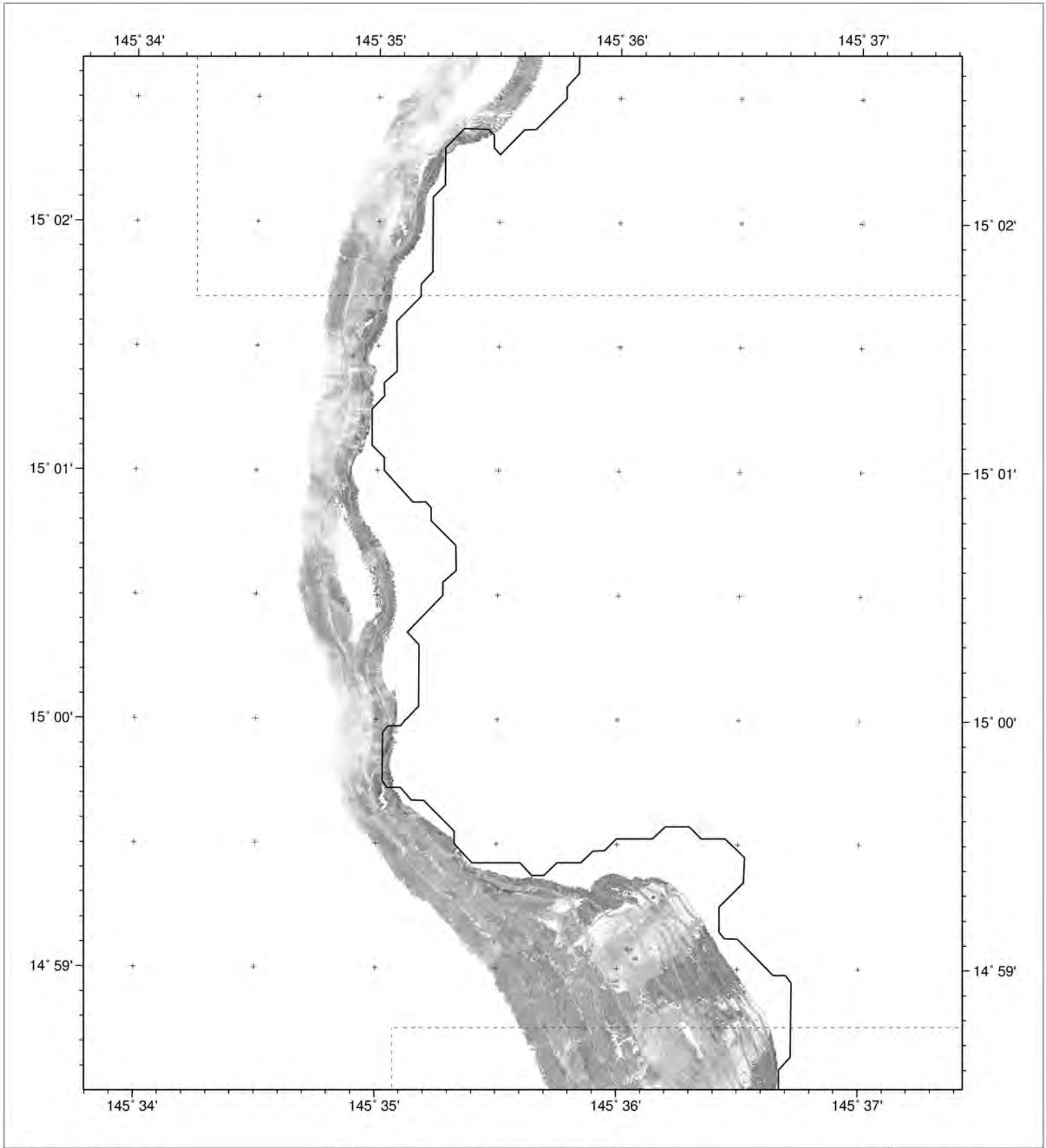


Chart 8-17

Tinian
ahi0304 ACOUSTIC IMAGERY

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*
NOT FOR Navigation

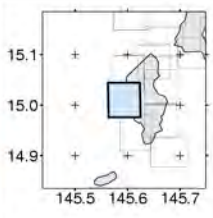
Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55
nautical miles
0 0 kilometers 1 1

low Backscatter Magnitude high

Grid size: 1 m
Elipsoid: WGS-84
Equipment: POS-MV CA-GPS
Coastline: GMT WVS and WDBII database

NOAA CORAL REEF ECOSYSTEM INVESTIGATION

HAWAI'I MAPPING RESEARCH GROUP



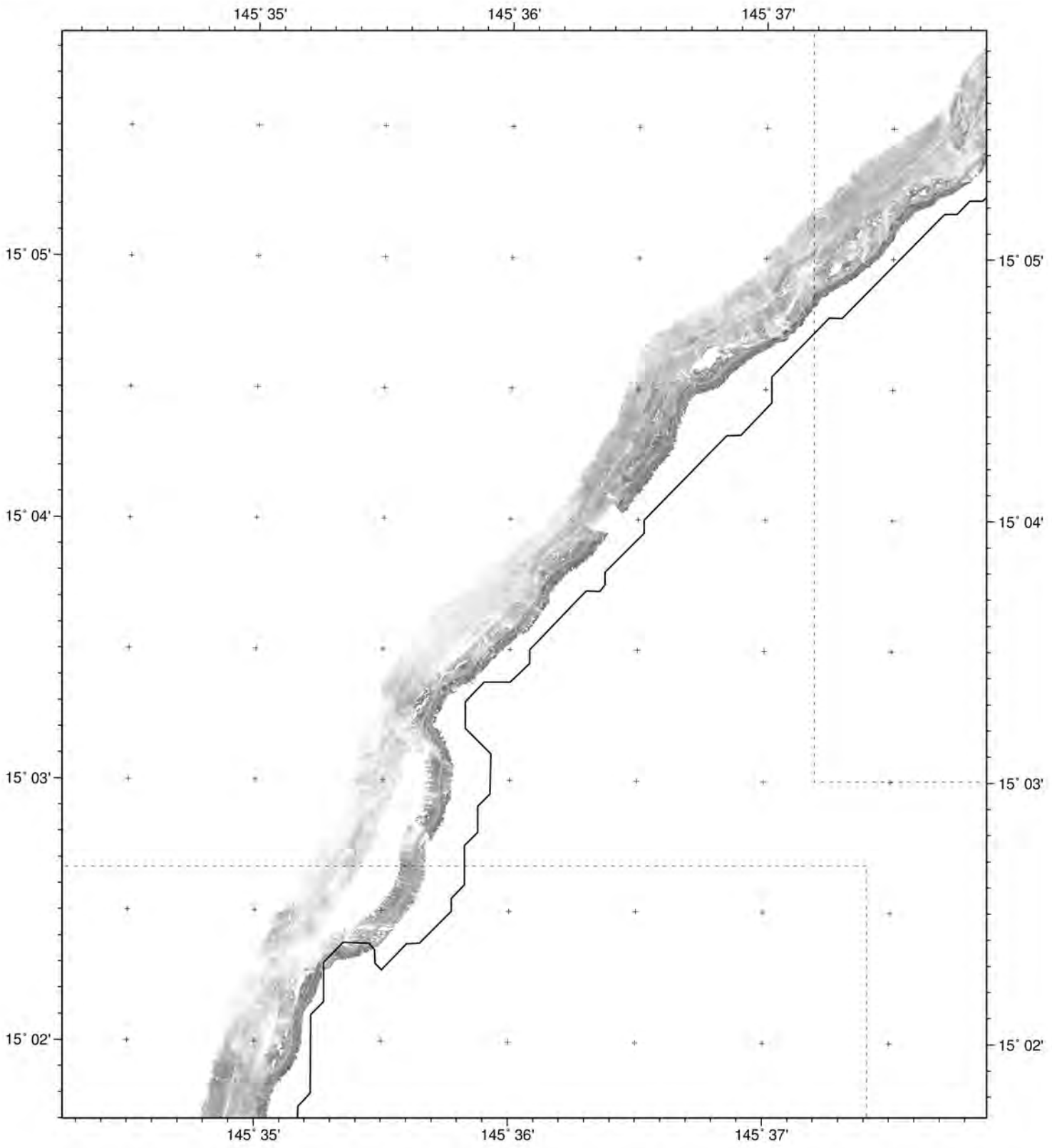


Chart 8-18

Tinian
ahi0304 ACOUSTIC IMAGERY

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*
NOT FOR Navigation

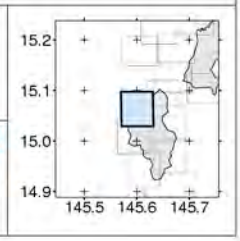
Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55
nautical miles
0 0 kilometers 1 1

low Backscatter Magnitude high

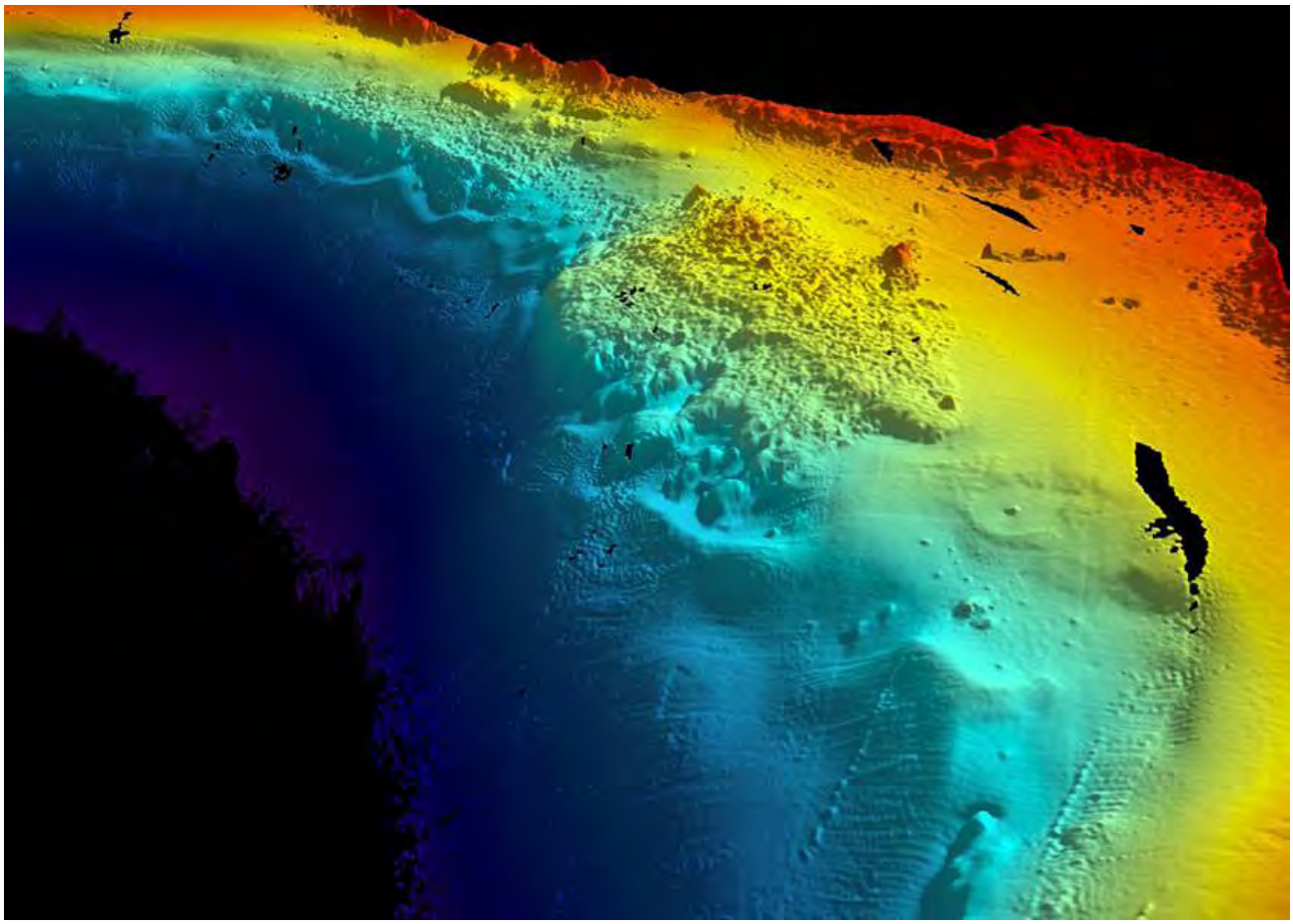
Grid size: 1 m
Elipsoid: WGS-84
Equipment: POS-MV CA-GPS
Coastline: GMT WVS and WDBII database

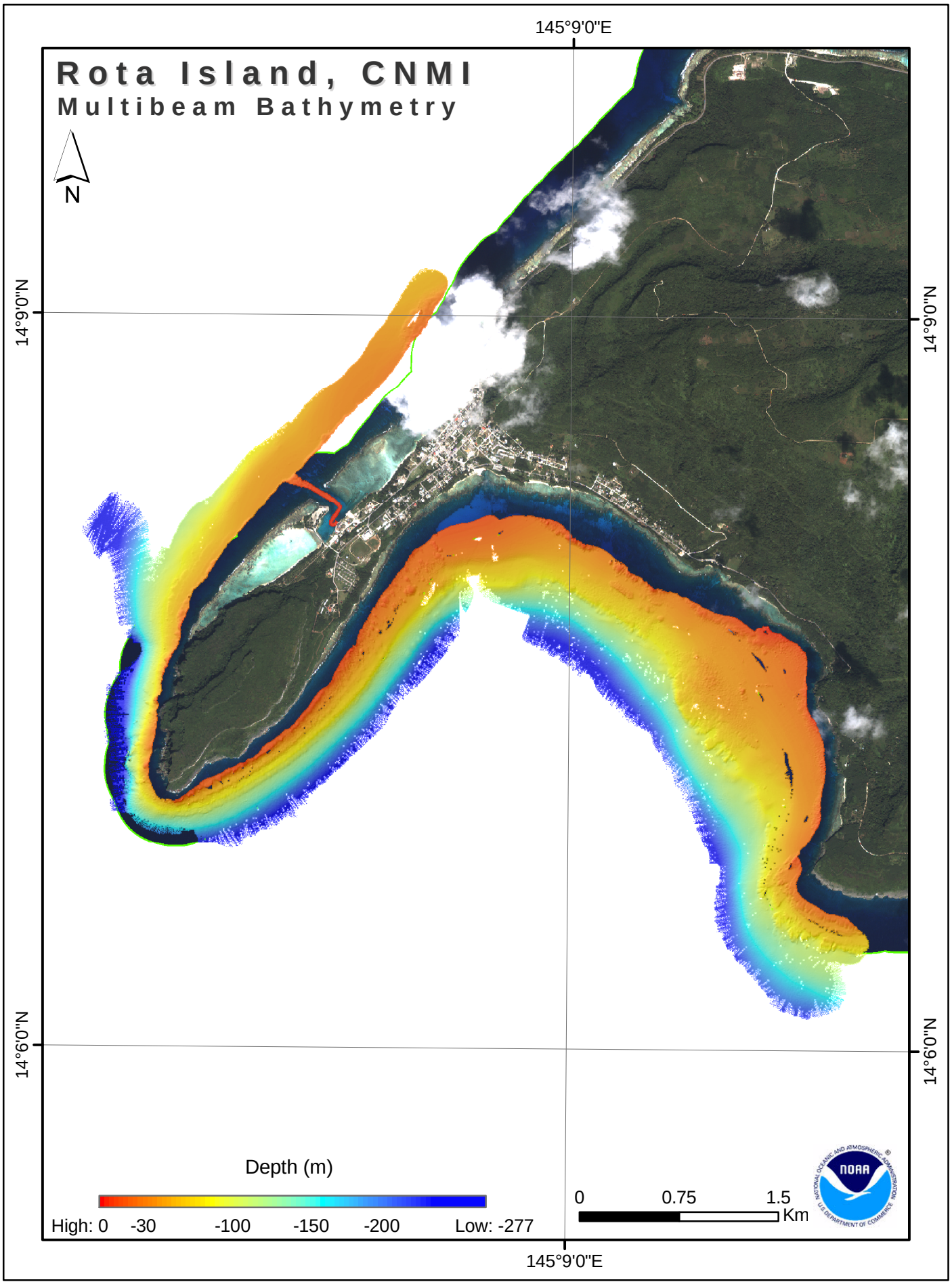
NOAA CORAL REEF ECOSYSTEM INVESTIGATION

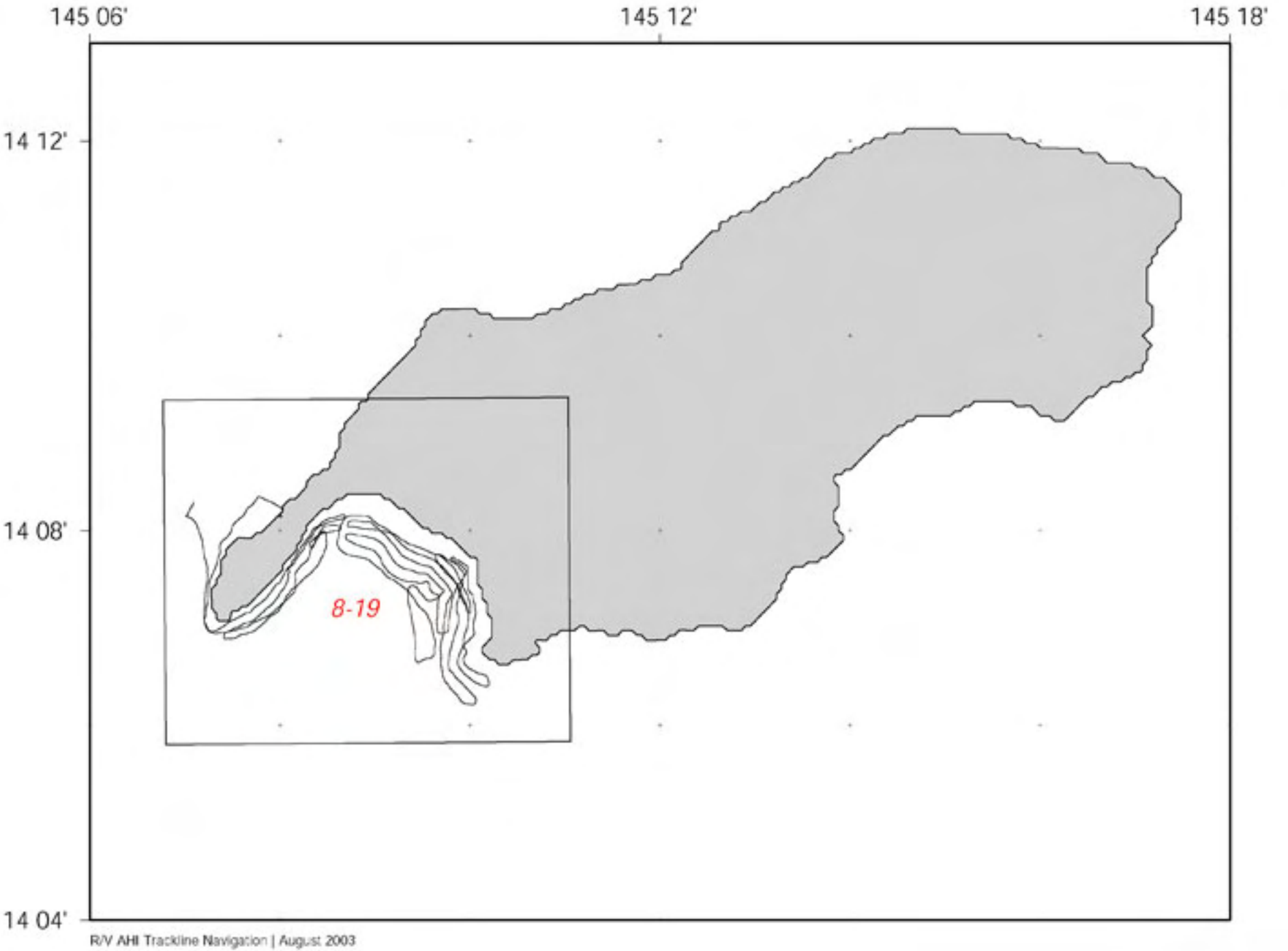
HAWAI'I MAPPING RESEARCH GROUP



Rota




Rota Island, CNMI
Multibeam Bathymetry
N
145°9'0"E
14°9'0"N
14°6'0"N
Depth (m)
High: 0
-30
-100
-150
-200
Low: -277
0
0.75
1.5
Km



R/V AHI Trackline Navigation | August 2003

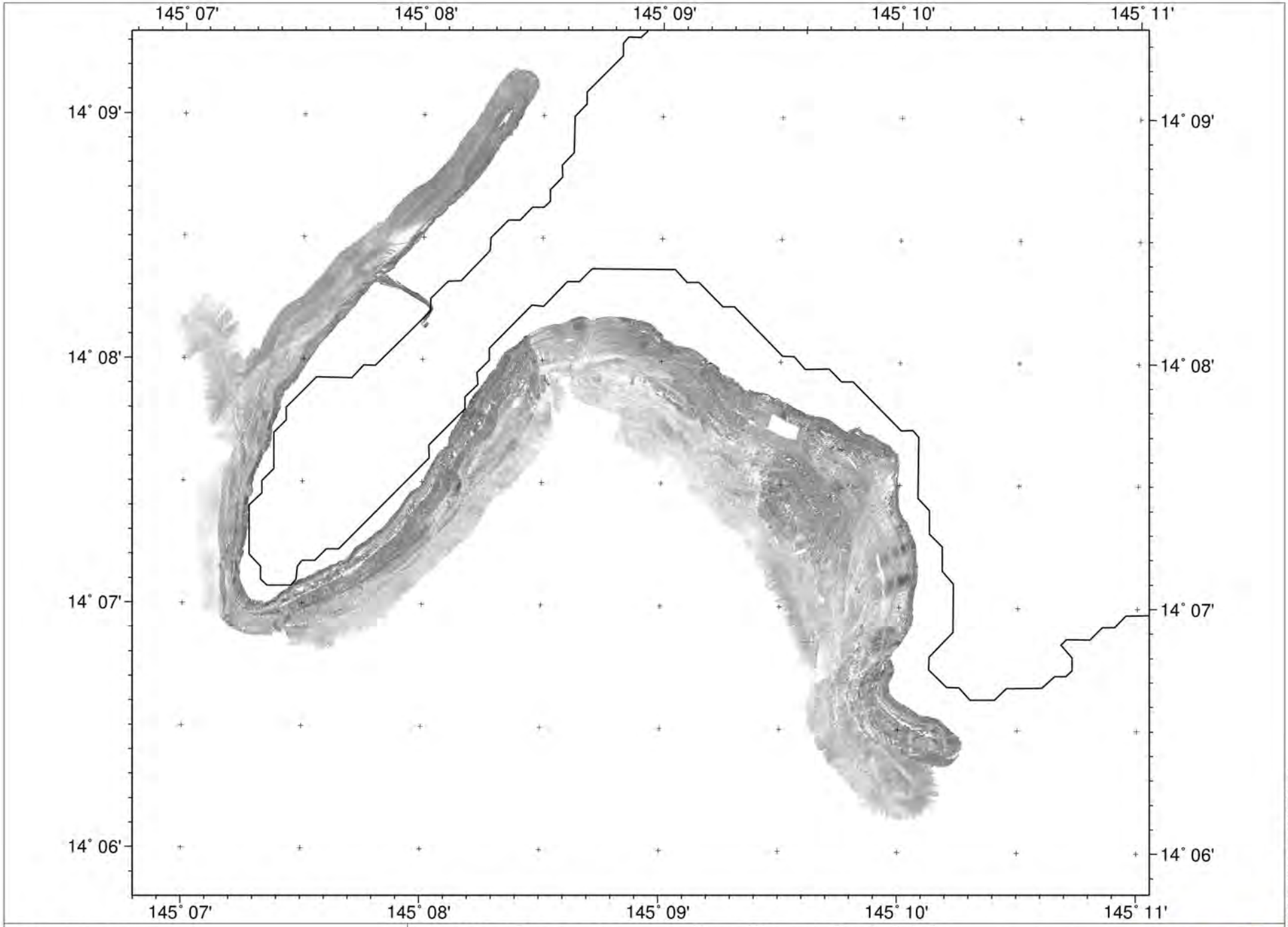


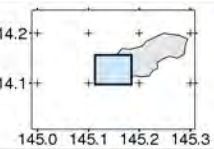
Chart 8-19
Rota

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*

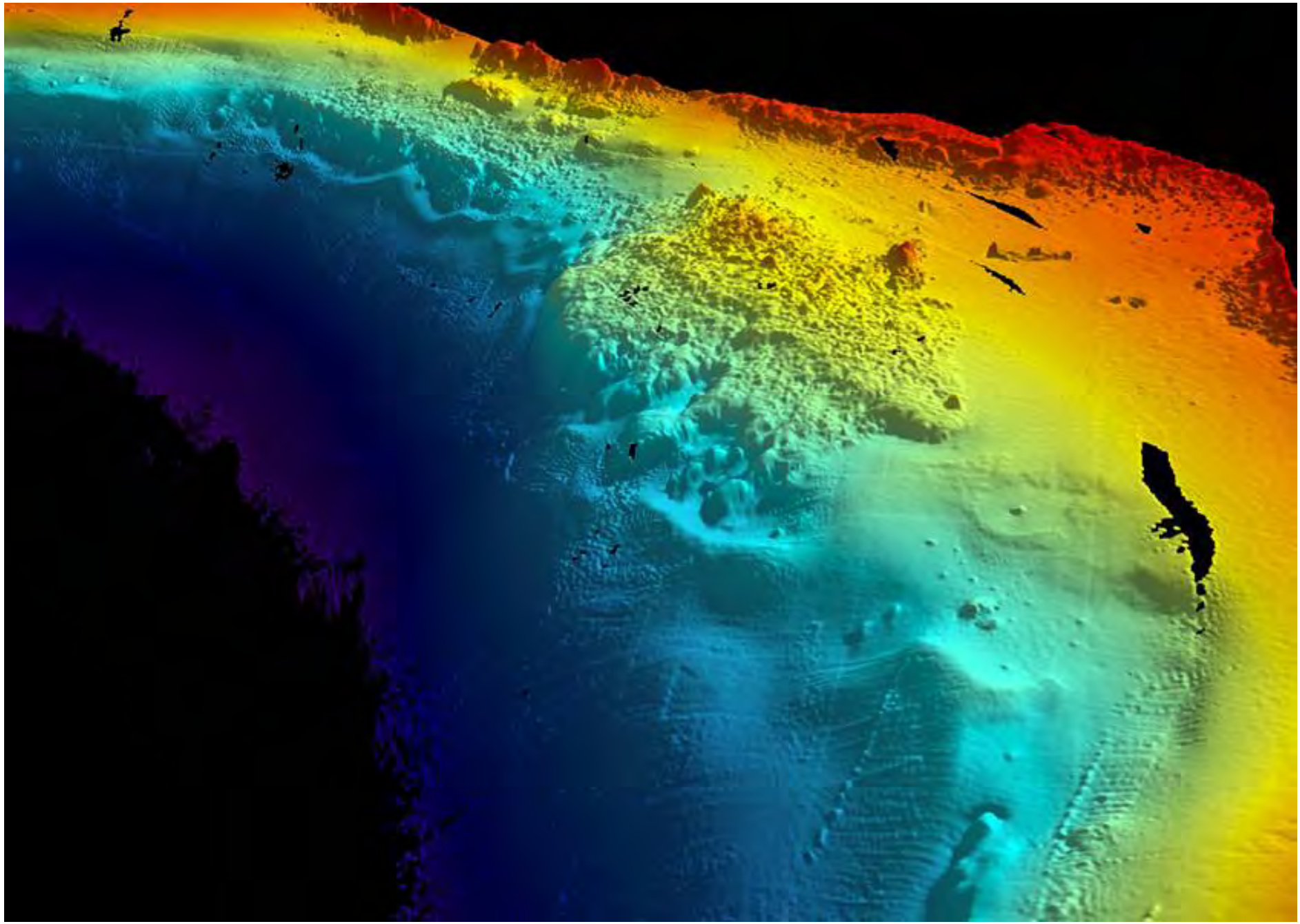
ahi0304 SIDESCAN

Grid size: 1 m
Coastline: GMT WVS and WDBII database
NOT FOR NAVIGATION

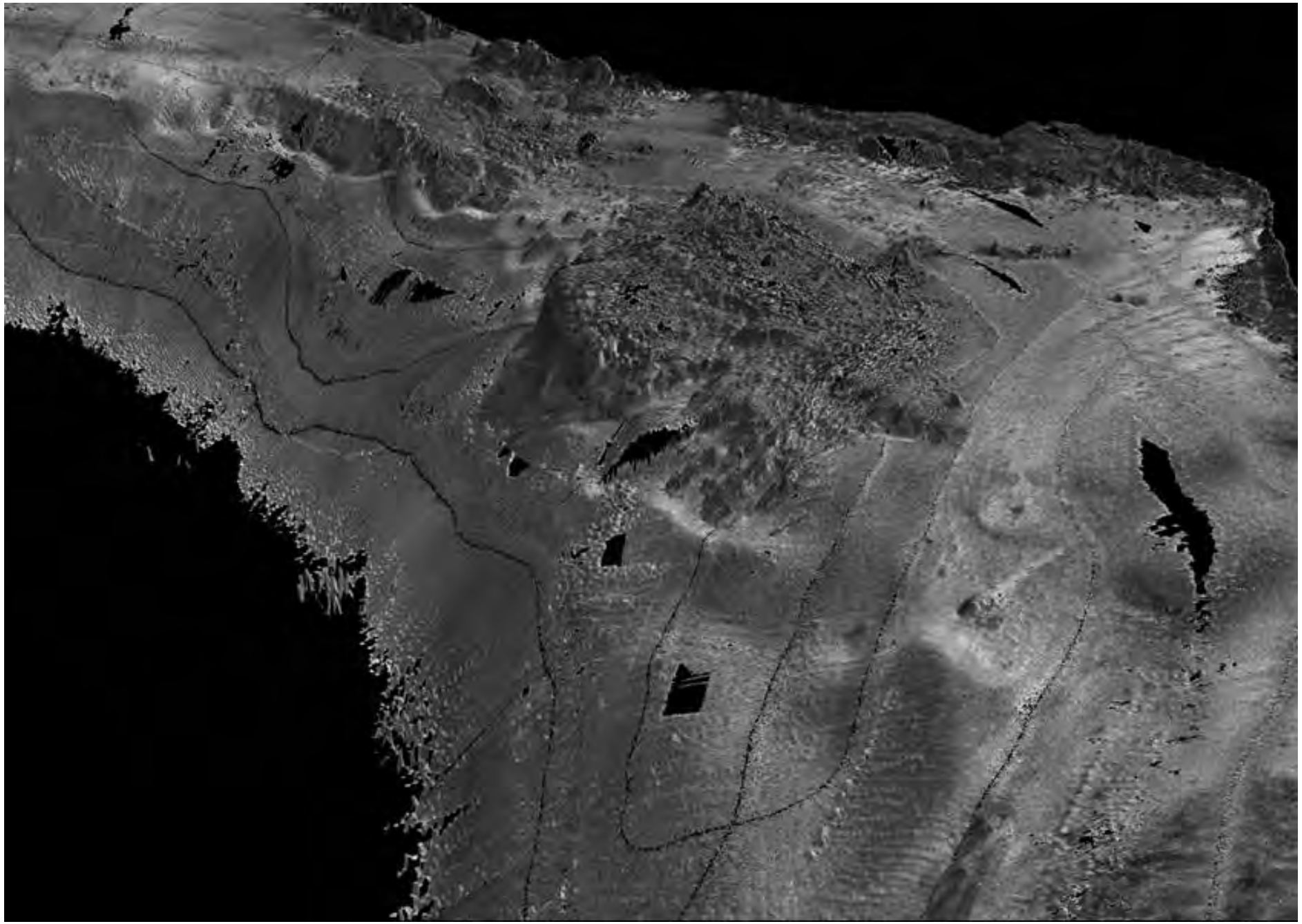
Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55 WGS-84
nautical miles
0 1
kilometers
0 1
Backscatter Magnitude
low high



NOAA CORAL REEF ECOSYSTEM INVESTIGATION
HAWAI'I MAPPING RESEARCH GROUP

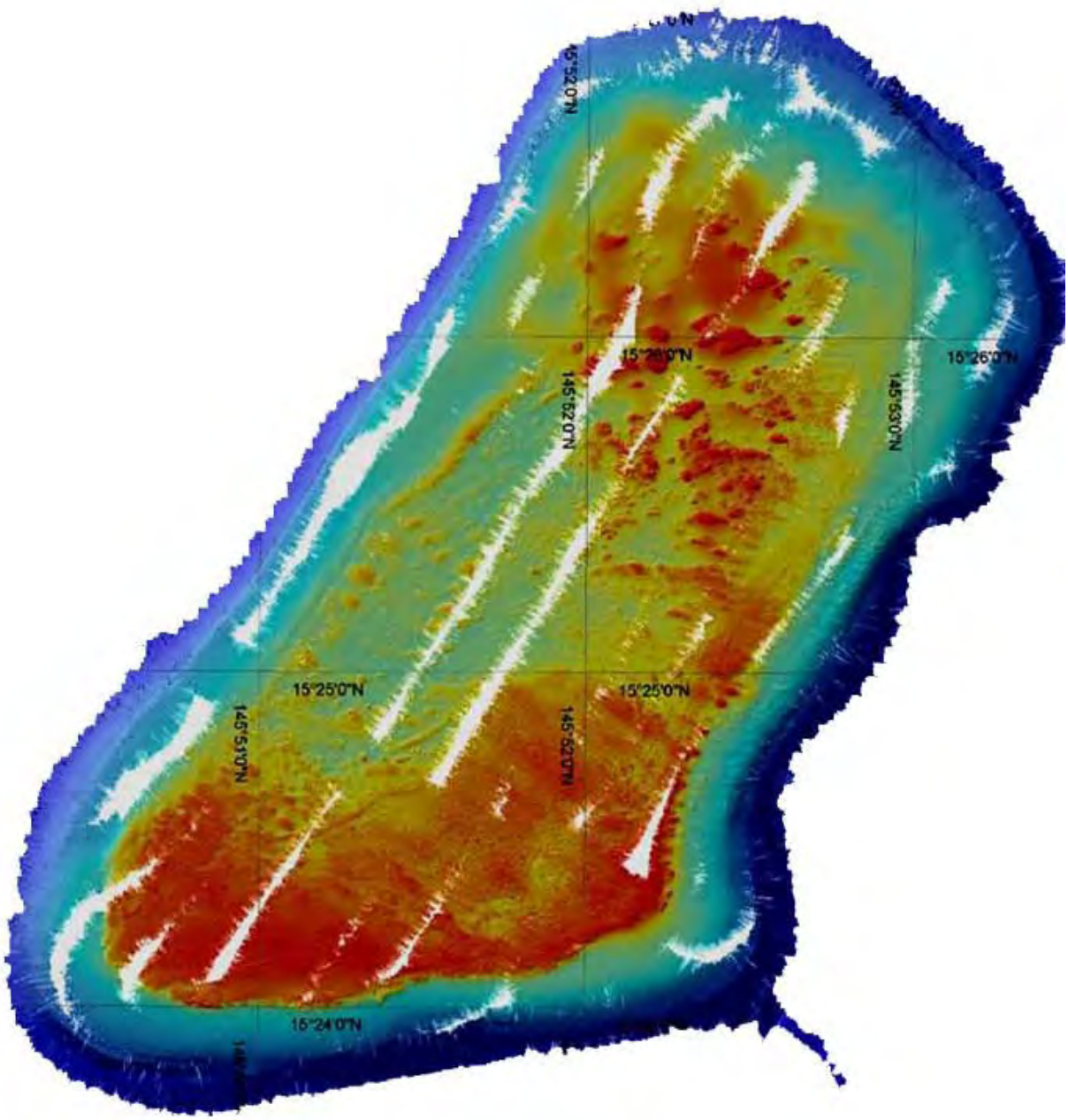


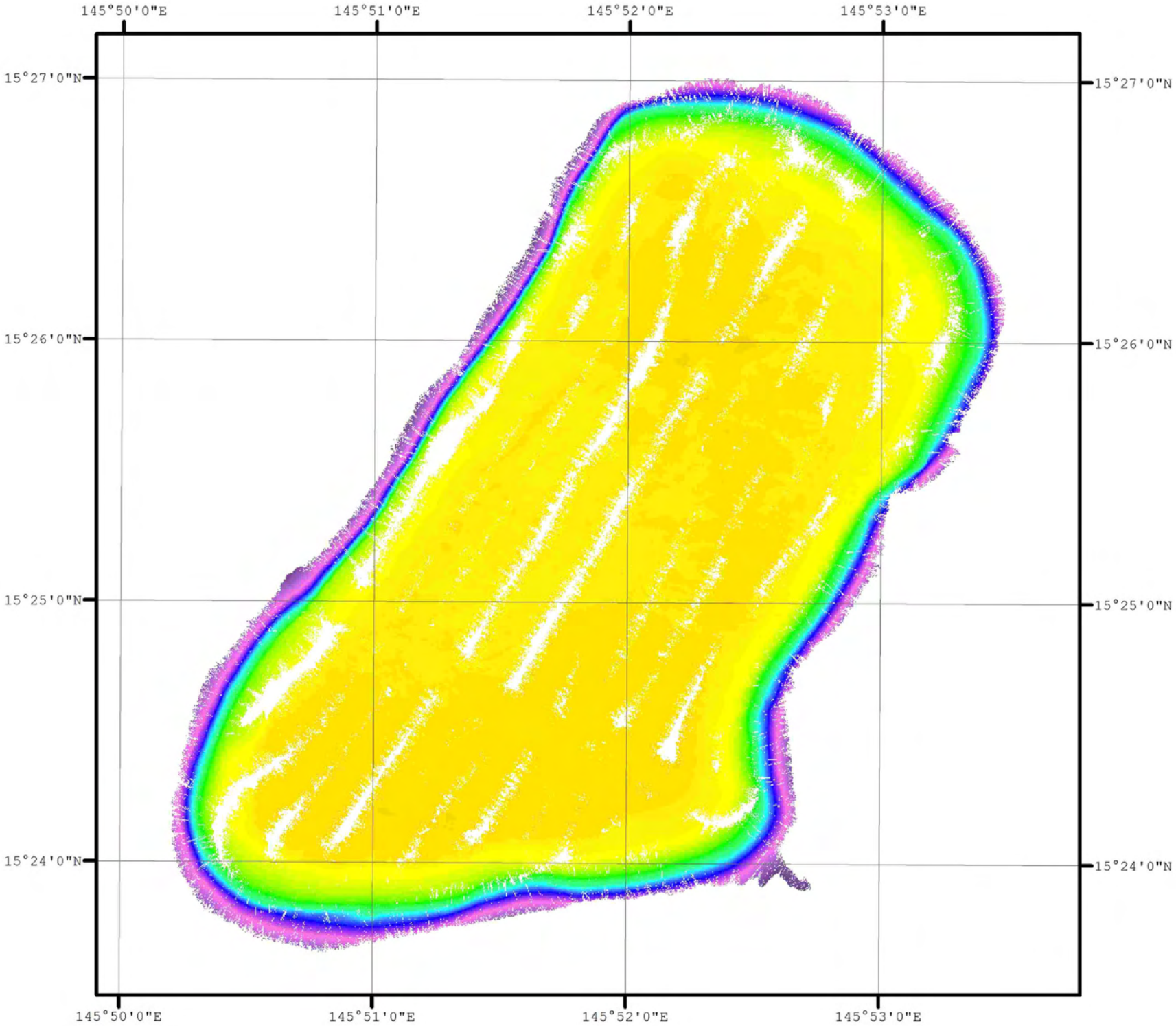
3D perspective of multibeam bathymetry where reds are shallow and blues are deeper. SW Rota 2003

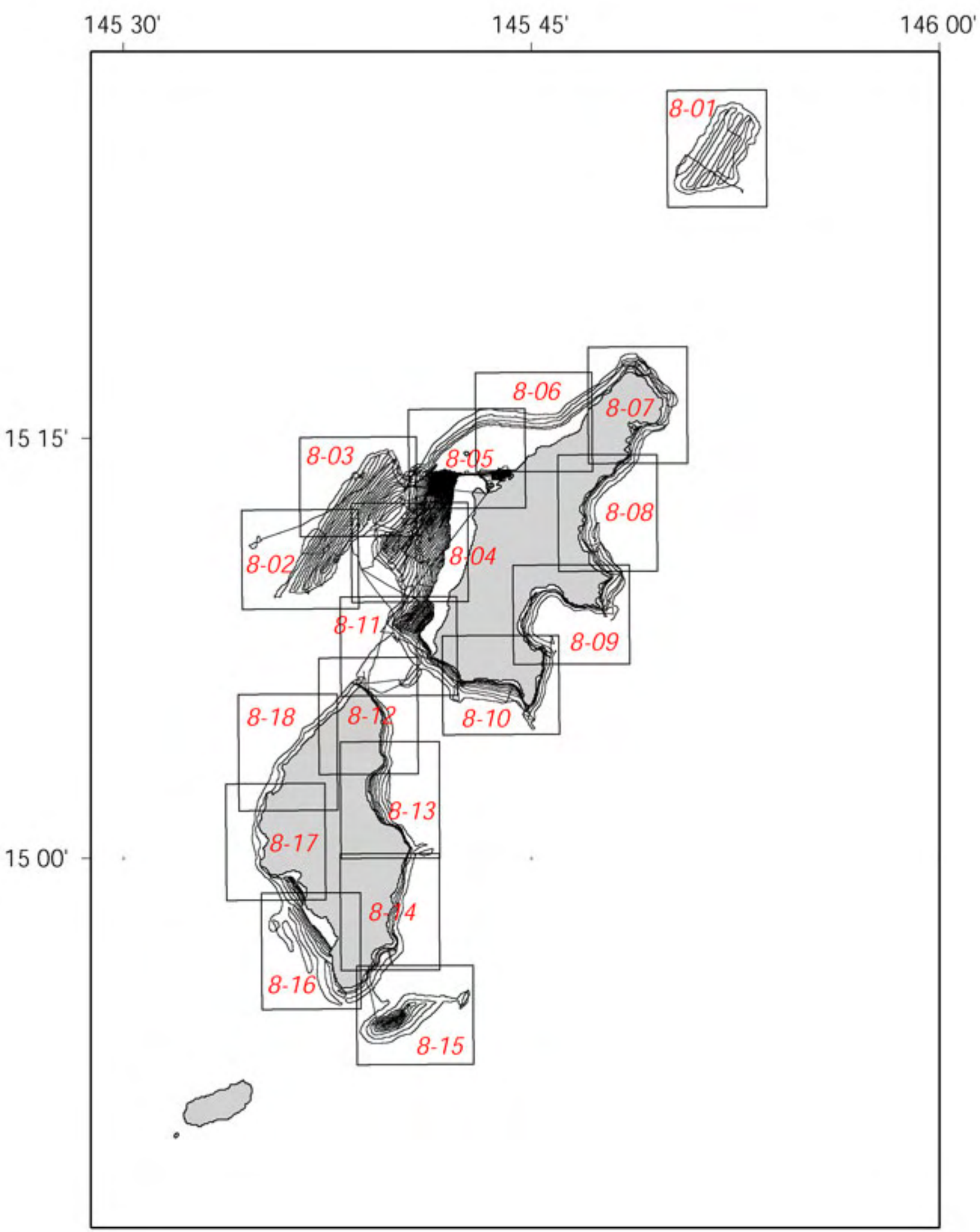


3D perspective of multibeam backscatter imagery where white is low intensity return (softbottom) and black is high intensity return (hardbottom). SW Rota 2003

Marpi Bank




145°50'0"E
145°51'0"E
145°52'0"E
145°53'0"E
15°27'0"N
15°26'0"N
15°25'0"N
15°24'0"N


145 30'
145 45'
146 00'
15 15'
15 00'
8-01
8-02
8-03
8-04
8-05
8-06
8-07
8-08
8-09
8-10
8-11
8-12
8-13
8-14
8-15
8-16
8-17
8-18

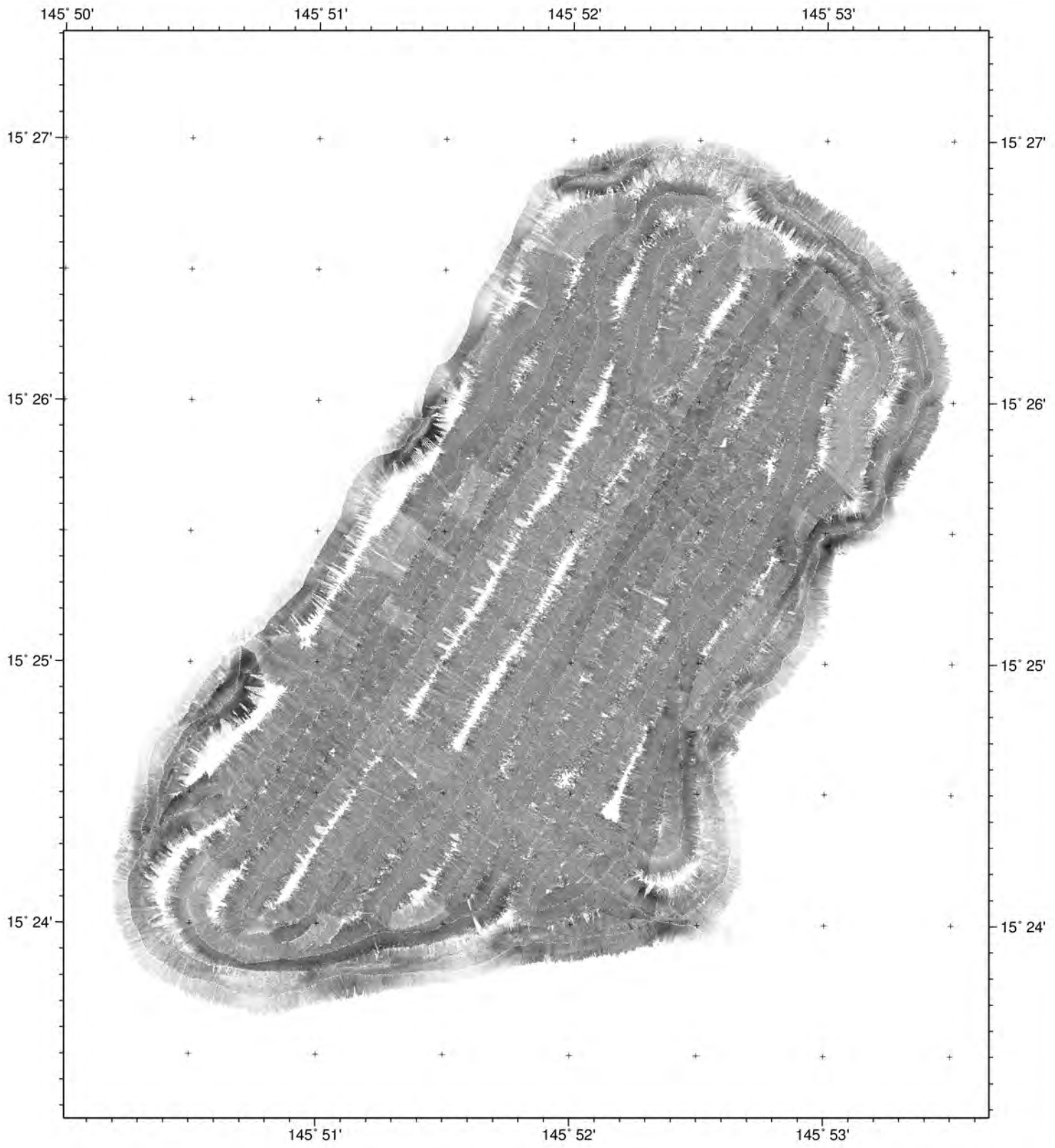


Chart 8-01

Marpi Bank, Saipan
ahi0304 ACOUSTIC IMAGERY

Rusty Brainard (NOAA-CRED)
AUG - SEP 2003 - R/V *AHI*
NOT FOR Navigation

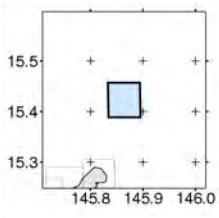
Universal Transverse Mercator Projection
Scale: 1:38000 UTM Zone 55
nautical miles 0 0 1
kilometers 1

low Backscatter Magnitude high

Grid size: 1 m Ellipsoid: WGS-84
Elipsoid: WGS-84
Equipment: POS-MV CA-GPS
Coastline: GMT WVS and WDBII database

NOAA CORAL REEF ECOSYSTEM INVESTIGATION

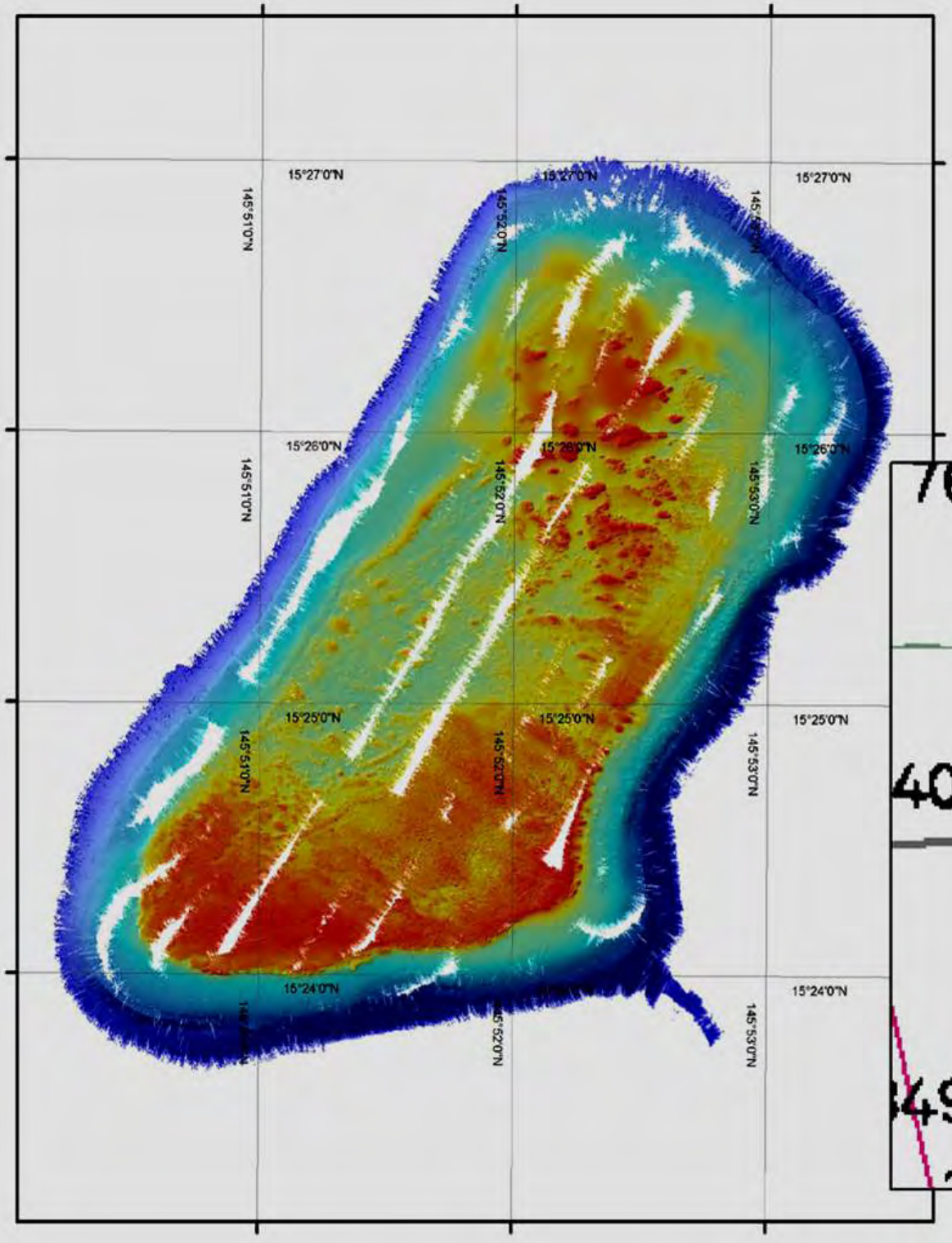
HAWAI'I MAPPING RESEARCH GROUP

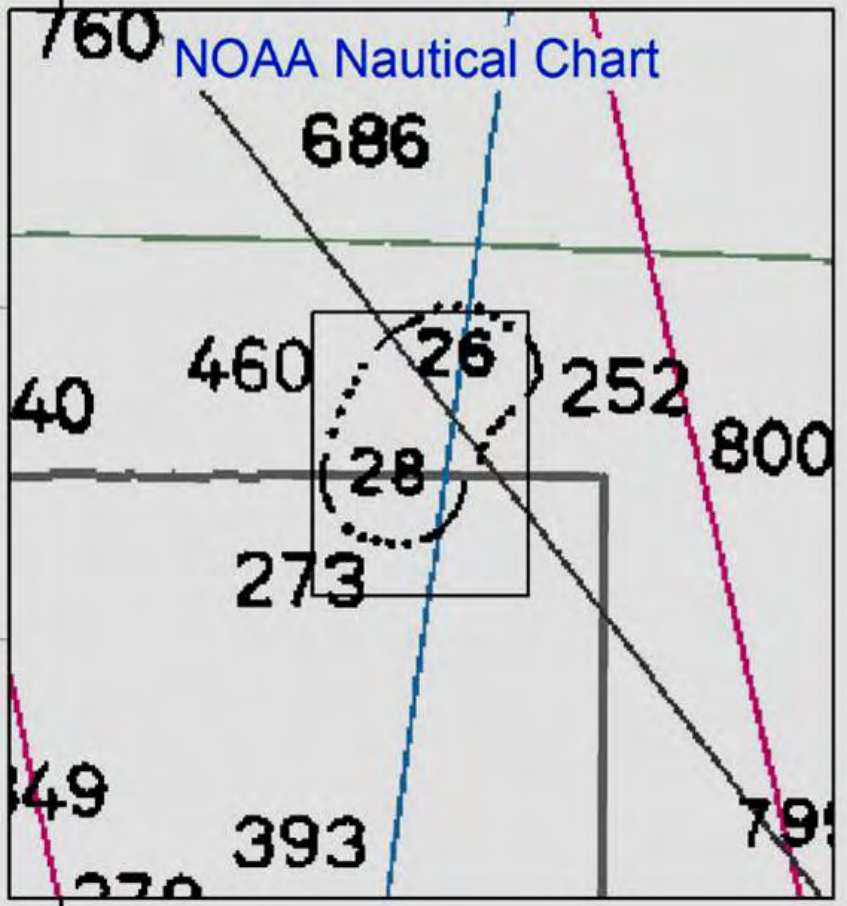


Marpi Bank

R/V Ahi

Aug- Sep 2003





Metadata: Bathymetry

Identification_Information:
Citation:
Citation_Information:
Originator: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
Publication_Date: 20040314
Title: Gridded bathymetry of northeastern Guam, including Pati Point Marine Preserve
Geospatial_Data_Presentation_Form: raster digital data
Online_Linkage: ftp://ftp.soest.hawaii.edu/pibhmc/data/marianas/guam_ne-5.asc.zip
Description:
Abstract: Gridded bathymetry of northeastern Guam, Territory of Guam. This survey includes Pati Point Marine Preserve and provides almost complete bottom coverage between 20 and 250 meters.
Purpose:
This grid was created using data gathered from multibeam soundings for use as a planning and reference document. Refer to supplemental information for description of instrument and survey.
Supplemental_Information:
Data were collected aboard the R/V AHI (Acoustic Habitat Investigator), a 25' survey launch owned and operated by the NOAA Pacific Islands Fisheries Science Center in Honolulu, HI. The R/V AHI's survey sensors include a 240 kHz RESON 8101-ER sonar providing bathymetry and imagery data, a TSS/Applanix POS/MV Model 320 which measures position, velocity, attitude and heading, and a Seabird SBE 19 CTD used to measure sound velocity profiles.

Equipment serial numbers and software versions are as follows:

RESON 8101-ER multibeam echosounder
DOC inventory #: CD0000537418
Firmware, dry: 8101-2.07-2D4D
Firmware, wet: 8101-1.06-2F6B

POS/MV Model 320, version 3
DOC inventory #: CD0000476647
PCS serial #: 474
IMU serial #: 203
Controller software: v 1.0.5.0

Seabird SBE19 CTD:
Serial #: 3029

R/V AHI Lever Arm Distances and Alignment Offsets
The R/V AHI Reference Point (RP) is defined to be the intersection of the vessel's centerline, the cabin deck and the bulkhead immediately aft of the transducer. This is marked by a punch in the deck weld at that location. Positive X means the point is forward of the RP, positive Y means the point is to starboard of the RP, positive Z means the point is below the RP. The loaded waterline is defined as the intersection of the vessel's performance wing with the hull at the transom.

Antenna Baseline Distance, m: 1.229
Transducer depth below waterline, m 0.62

RP to IMU	0.80	0.00	0.08
RP to Primary GPS Antenna	-3.55	-0.61	-1.88
RP to Vessel	0.16	0.00	0.77
RP to Sensor 1(MB transducer)	0.16	0.00	0.77
RP to Sensor 2	0	0	0
RP to Aux. GPS Antenna	0	0	0
RP to Heave lever arm(deg)	-0.67	0.00	0.00
IMU rotation Ref. Frame, deg	0	0	0
Sensor 1 rotation Ref. Frame, deg	0	0	0
Sensor 2 rotation Ref. Frame, deg	0	0	0

Roll offset: +0.5 deg
Pitch offset: 0.0 deg
Gyro offset: 0.0 deg

Time_Period_of_Content:
  Time_Period_Information:
    Range_of_Dates/Times:
      Beginning_Date: 20030919
      Ending_Date: 20030929
  Currentness_Reference: ground condition
Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: 144.843324
    East_Bounding_Coordinate: 144.973913
    North_Bounding_Coordinate: 13.671329
    South_Bounding_Coordinate: 13.543463

Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Gridded bathymetry
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Guam
Place_Keyword: Pati Point Preserve
Place_Keyword: U.S. Territory of Guam
Access_Constraints: None
Use_Constraints: These data are not to be used for navigation purposes.
Please acknowledge the NOAA Coral Reef Ecosystem Division,
Pacific Islands Fisheries Science Center as the source of this information.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Benthic Habitat Mapping Group,
Coral Reef Ecosystem Division, PIFSC,NOAA
Contact_Person: Joyce Miller
Contact_Address:
Address_Type: mailing and physical address
Address: 1125B Ala Moana Blvd
City: Honolulu
State_or_Province: HI
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-8303
Contact_Electronic_Mail_Address: joyce.miller@noaa.gov
Browse_Graphic:
Browse_Graphic_File_Name: guam_ne-5.jpg
Browse_Graphic_File_Description: Gridded Bathymetry
Browse_Graphic_File_Type: JPEG
Data_Set_Credit: Benthic Habitat Mapping Group, Coral Reef Ecosystem Division
(CRED), Pacific Islands Fisheries Science Center (PIFSC), NOAA
Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report: Data are collected for resource management
and research purposes and are tested for internal consistency; however,
no effort is made to compare these data to external references or to
other published data.
Logical_Consistency_Report: Unspecified
Completeness_Report: Complete
Positional_Accuracy:

Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Horizontal positioning system: GPS SPS
Horizontal position accuracy: 5
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report:
Range resolution of sonar ~ 1.25 cm
Raw sounding resolution: 1 cm
Vertical accuracy of gridded product ~ 1 meter
Lineage:
Process_Step:
Process_Description:
Science Applications International Corporation's
(SAIC) ISS-2000 acquires, processes and records data, provides survey control and underway quality control displays. SAIC's SABER processing software is used to process the raw soundings, analyze the results, manually edit the sounding data to remove outliers and derive average gridded data values. GMT was then used to reformat the grid into final form. Interactive Visualization System's Fledermaus and ESRI ArcGIS were used for viewing results and creating browse objects.

The data have been corrected for observed tides from Guam tide gauge 1630000. The data were recorrected for observed sound velocities in postprocessing.

Software used:
SAIC ISS-2000 Acquisition Software, v 3.4 (20030610)
SAIC SABER Processing Software, v 2.0.2 (20030610)
GMT Generic Mapping Tools, v 3.4.2 (20021002)

Process_Date: 20040603
Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Raster
Raster_Object_Information:
Raster_Object_Type: Grid Cell
Row_Count: 2806
Column_Count: 2803
Vertical_Count: 1
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: row and column

Coordinate_Representation:
Abscissa_Resolution: 5
Ordinate_Resolution: 5
Planar_Distance_Units: meters
Grid_Coordinate_System:
Grid_Coordinate_System_Name: Universal Transverse Mercator
Universal_Transverse_Mercator:
UTM_Zone_Number: 55
Transverse_Mercator:
Scale_Factor_at_Central_Meridian: 0.9996
Longitude_of_Central_Meridian: 147
Latitude_of_Projection_Origin: 0
False_Easting: 500000
False_Northing: 0
Geodetic_Model:
Horizontal_Datum_Name: D_WGS_1984
Ellipsoid_Name: WGS_1984
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257224
Vertical_Coordinate_System_Definition:
Depth_System_Definition:
Depth_Datum_Name: mean lower low water
Depth_Resolution: 0.01 meters
Depth_Distance_Units: meters
Depth_Encoding_Method: Attribute values
Entity_and_Attribute_Information:
Overview_Description:
Entity_and_Attribute_Overview:
Depth values are real values based on the average of the soundings that fell within the extracted grid cells. Number of soundings per grid cell range from >1000 soundings in shallow depths to as few as 20 soundings in deeper areas. A total error budget for this survey has not been developed, therefore the accuracy of depth measurements should be considered to be within 1 meter.
Entity_and_Attribute_Detail_Citation: none
Distribution_Information:
Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
Contact_Person: Joyce E. Miller
Contact_Position: Oceanographer
Contact_Address:

Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-8303
Contact_Electronic_Mail_Address: joyce.miller@noaa.gov
Resource_Description: Downloadable Data
Distribution_Liability:
These data are not to be used for navigational purposes.
NOAA makes no warranty regarding these data, expressed or implied, nor does the fact of distribution constitute such a warranty. NOAA cannot assume liability for any damages caused by any errors or omissions in these data, nor as a result of the failure of these data to function on a particular system.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: ASCII ARC/INFO Grid
Format_Information_Content:
ASCII ARC/INFO grid
Files of this type can be imported with ArcToolbox 8.3 using the following path: Conversion Tools;Import to Raster;ASCII to Grid (Float).

These data as having the following header format and description

NCOLS xxx
NROWS xxx
XLLCORNER xxx
YLLCORNER xxx
CELLSIZE xxx
NODATA_VALUE xxx
ROW 1
ROW 2
.
.
.
ROW n
where:

NCOLS is the number of columns in the ASCII file.

NROWS is the number of rows in the ASCII file.
XLLCORNER is the x coordinate for lower left corner of the
lower left most cell in the grid.
YLLCORNER is the x coordinate for the lower left corner
of the lower left most cell in the grid.
CELLSIZE is the length of a cell's edge.
NODATA_VALUE is the value in the ASCII file representing
unknown values.
xxx are numbers, and the cell values are space delimited
File_Decompression_Technique: Zip file
Transfer_Size: 4.4
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name: ftp://ftp.soest.hawaii.edu/pibhmc/data/marianas/guam_ne-5.asc.zip
Fees: None
Metadata_Reference_Information:
Metadata_Date: 20040701
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
Contact_Person: Dr. Michael Parke
Contact_Position: Research Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-7025
Contact_Electronic_Mail_Address: michael.parke@noaa.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Access_Constraints: None
Metadata_Use_Constraints: None

Identification_Information:
Citation:
Citation_Information:
Originator: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
Publication_Date: 20040708
Title: Gridded bathymetry of Saipan, Commonwealth of Northern Mariana Islands
Geospatial_Data_Presentation_Form: raster digital data
Online_Linkage: ftp://ftp.soest.hawaii.edu/pibhmc/data/marianas/saipan-5.asc.zip
Description:
Abstract: Gridded bathymetry of the banktops and shelf environments of Saipan Island, Commonwealth of Northern Mariana Islands. Almost complete bottom coverage was achieved in depths between 20 and 250 meters, including the extensive banks of Garapan Anchorage.
Purpose:
This grid was created using data gathered from multibeam soundings for use as a planning and reference document. Refer to supplemental information for description of instrument and survey.
Supplemental_Information:
Data were collected aboard the R/V AHI (Acoustic Habitat Investigator), a 25’ survey launch owned and operated by the NOAA Pacific Islands Fisheries Science Center in Honolulu, HI. The R/V AHI’s survey sensors include a 240 kHz RESON 8101-ER sonar providing bathymetry and imagery data, a TSS/Applanix POS/MV Model 320 which measures position, velocity, attitude and heading, and a Seabird SBE 19 CTD used to measure sound velocity profiles.

Equipment serial numbers and software versions are as follows:

RESON 8101-ER multibeam echosounder
DOC inventory #: CD0000537418
Firmware, dry: 8101-2.07-2D4D
Firmware, wet: 8101-1.06-2F6B

POS/MV Model 320, version 3
DOC inventory #: CD0000476647
PCS serial #: 474
IMU serial #: 203
Controller software: v 1.0.5.0

Seabird SBE19 CTD:
Serial #: 3029

R/V AHI Lever Arm Distances and Alignment Offsets
The R/V AHI Reference Point (RP) is defined to be the intersection of the vessel's centerline, the cabin deck and the bulkhead immediately aft of the transducer. This is marked by a punch in the deck weld at that location. Positive X means the point is forward of the RP, positive Y means the point is to starboard of the RP, positive Z means the point is below the RP. The loaded waterline is defined as the intersection of the vessel's performance wing with the hull at the transom.

Antenna Baseline Distance, m: 1.229
Transducer depth below waterline, m 0.62

RP to IMU	0.80	0.00	0.08
RP to Primary GPS Antenna	-3.55	-0.61	-1.88
RP to Vessel	0.16	0.00	0.77
RP to Sensor 1(MB transducer)	0.16	0.00	0.77
RP to Sensor 2	0	0	0
RP to Aux. GPS Antenna	0	0	0
RP to Heave lever arm(deg)	-0.67	0.00	0.00
IMU rotation Ref. Frame, deg	0	0	0
Sensor 1 rotation Ref. Frame, deg	0	0	0
Sensor 2 rotation Ref. Frame, deg	0	0	0

Roll offset: +0.5 deg
Pitch offset: 0.0 deg
Gyro offset: 0.0 deg

Time_Period_of_Content:
  Time_Period_Information:
    Range_of_Dates/Times:
      Beginning_Date: 20030823
      Ending_Date: 20030912
  Currentness_Reference: ground condition
Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: 145.57453
    East_Bounding_Coordinate: 145.842424
    North_Bounding_Coordinate: 15.301176

South_Bounding_Coordinate: 15.068555
Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Gridded bathymetry
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Garapan Anchorage
Place_Keyword: Saipan
Place_Keyword: Commonwealth of the Northern Mariana Islands
Access_Constraints: None
Use_Constraints: These data are not to be used for navigation purposes.
Please acknowledge the NOAA Coral Reef Ecosystem Division,
Pacific Islands Fisheries Science Center as the source of this information.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Benthic Habitat Mapping Group,
Coral Reef Ecosystem Division, PIFSC,NOAA
Contact_Person: Joyce Miller
Contact_Address:
Address_Type: mailing and physical address
Address: 1125B Ala Moana Blvd
City: Honolulu
State_or_Province: HI
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-8303
Contact_Electronic_Mail_Address: joyce.miller@noaa.gov
Browse_Graphic:
Browse_Graphic_File_Name: saipan-5.jpg
Browse_Graphic_File_Description: Gridded Bathymetry
Browse_Graphic_File_Type: JPEG
Data_Set_Credit: Benthic Habitat Mapping Group, Coral Reef Ecosystem Division
(CRED), Pacific Islands Fisheries Science Center (PIFSC), NOAA
Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report: Data are collected for resource management
and research purposes and are tested for internal consistency; however,
no effort is made to compare these data to external references or to
other published data.
Logical_Consistency_Report: Unspecified
Completeness_Report: Complete

Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Horizontal positioning system: GPS SPS
Horizontal position accuracy: 5 meters
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report:
Range resolution of sonar ~ 1.25 cm
Raw sounding resolution: 1 cm
Vertical accuracy of gridded product ~ 1 meter
Lineage:
Process_Step:
Process_Description:
Science Applications International Corporation's
(SAIC) ISS-2000 acquires, processes and records data, provides survey control and underway quality control displays. SAIC's SABER processing software is used to process the raw soundings, analyze the results, manually edit the sounding data to remove outliers and derive average gridded data values. GMT was then used to reformat the grid into final form. Interactive Visualization System's Fledermaus and ESRI ArcGIS were used for viewing results and creating browse objects.

The data have been corrected for observed tides from Guam tide gauge 1630000 with a time corrector of 18 minutes and a tide height multiplier of 0.94 using SABER postprocessing software. The data were also recorrected for observed sound velocities in postprocessing.

Software used:
SAIC ISS-2000 Acquisition Software, v 3.4 (20030610)
SAIC SABER Processing Software, v 2.0.2 (20030610)
GMT Generic Mapping Tools, v 3.4.2 (20021002)

Process_Date: 20040706
Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Raster
Raster_Object_Information:
Raster_Object_Type: Grid Cell
Row_Count: 5181
Column_Count: 5726
Vertical_Count: 1
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:

```
      Planar_Coordinate_Information:
        Planar_Coordinate_Encoding_Method: row and column
        Coordinate_Representation:
          Abscissa_Resolution: 5
          Ordinate_Resolution: 5
        Planar_Distance_Units: meters
      Grid_Coordinate_System:
        Grid_Coordinate_System_Name: Universal Transverse Mercator
        Universal_Transverse_Mercator:
          UTM_Zone_Number: 55
          Transverse_Mercator:
            Scale_Factor_at_Central_Meridian: 9.9996
            Longitude_of_Central_Meridian: 147
            Latitude_of_Projection_Origin: 0
            False_Easting: 500000
            False_Northing: 0
    Geodetic_Model:
      Horizontal_Datum_Name: D_WGS_1984
      Ellipsoid_Name: WGS_1984
      Semi-major_Axis: 6378137.000000
      Denominator_of_Flattening_Ratio: 298.257224
  Vertical_Coordinate_System_Definition:
    Depth_System_Definition:
      Depth_Datum_Name: mean lower low water
      Depth_Resolution:  0.01 meters
      Depth_Distance_Units: meters
      Depth_Encoding_Method: Attribute values
Entity_and_Attribute_Information:
  Overview_Description:
    Entity_and_Attribute_Overview:
      Depth values are real values based on the average of the
      soundings that fell within the extracted grid cells.  Number of
      soundings per grid cell range from >1000 soundings in shallow depths
      to as few as 20 soundings in deeper areas.  A total error budget for
      this survey has not been developed, therefore the accuracy of depth
      measurements should be considered to be within 1 meter.
    Entity_and_Attribute_Detail_Citation: none
Distribution_Information:
  Distributor:
    Contact_Information:
      Contact_Organization_Primary:
        Contact_Organization: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
        Contact_Person: Joyce E. Miller
```

Contact_Position: Oceanographer
Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-8303
Contact_Electronic_Mail_Address: joyce.miller@noaa.gov
Resource_Description: Downloadable Data
Distribution_Liability:
These data are not to be used for navigational purposes.
NOAA makes no warranty regarding these data, expressed or implied, nor
does the fact of distribution constitute such a warranty. NOAA cannot
assume liability for any damages caused by any errors or omissions in
these data, nor as a result of the failure of these data to function
on a particular system.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: ASCII ARC/INFO Grid
Format_Information_Content:
ASCII ARC/INFO grid
Files of this type can be imported with ArcToolbox 8.3 using the
following path: Conversion Tools;Import to Raster;ASCII to Grid
(Float).

These data as having the following header format and description

NCOLS xxx
NROWS xxx
XLLCORNER xxx
YLLCORNER xxx
CELLSIZE xxx
NODATA_VALUE xxx
ROW 1
ROW 2
.
.
.
ROW n
where:

NCOLS is the number of columns in the ASCII file.
NROWS is the number of rows in the ASCII file.
XLLCORNER is the x coordinate for lower left corner of the
lower left most cell in the grid.
YLLCORNER is the x coordinate for the lower left corner
of the lower left most cell in the grid.
CELLSIZE is the length of a cell's edge.
NODATA_VALUE is the value in the ASCII file representing
unknown values.
xxx are numbers, and the cell values are space delimited
File_Decompression_Technique: Zip file
Transfer_Size: 20.3
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name: ftp://ftp.soest.hawaii.edu/pibhmc/data/marianas/saipan-5.asc.zip
Fees: None
Metadata_Reference_Information:
Metadata_Date: 20040709
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
Contact_Person: Dr. Michael Parke
Contact_Position: Research Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-7025
Contact_Electronic_Mail_Address: michael.parke@noaa.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Access_Constraints: None
Metadata_Use_Constraints: None

Identification_Information:
Citation:
Citation_Information:
Originator: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
Publication_Date: 20040504
Title: Gridded bathymetry of Garapan Anchorage off Saipan Harbor,
Commonwealth of Northern Mariana Islands
Geospatial_Data_Presentation_Form: raster digital data
Online_Linkage: ftp://ftp.soest.hawaii.edu/pibhmc/data/marianas/saipan_anc-5.asc.zip
Description:
Abstract: Gridded bathymetry of Garapan Anchorage off Saipan Harbor,
Commonwealth of Northern Mariana Islands. Almost complete bottom coverage
was achieved on these extensive banks in depths between 20 and 250 meters.
Purpose:
This grid was created using data gathered from multibeam soundings
for use as a planning and reference document. Refer to supplemental
information for description of instrument and survey.
Supplemental_Information:
Data were collected aboard the R/V AHI (Acoustic Habitat Investigator),
a 25’ survey launch owned and operated by the NOAA Pacific Islands
Fisheries Science Center in Honolulu, HI. The R/V AHI’s survey sensors
include a 240 kHz RESON 8101-ER sonar providing bathymetry and imagery
data, a TSS/Applanix POS/MV Model 320 which measures position, velocity,
attitude and heading, and a Seabird SBE 19 CTD used to measure sound
velocity profiles.

Equipment serial numbers and software versions are as follows:

RESON 8101-ER multibeam echosounder
DOC inventory #: CD0000537418
Firmware, dry: 8101-2.07-2D4D
Firmware, wet: 8101-1.06-2F6B

POS/MV Model 320, version 3
DOC inventory #: CD0000476647
PCS serial #: 474
IMU serial #: 203
Controller software: v 1.0.5.0

Seabird SBE19 CTD:
Serial #: 3029

R/V AHI Lever Arm Distances and Alignment Offsets
The R/V AHI Reference Point (RP) is defined to be the intersection of the vessel's centerline, the cabin deck and the bulkhead immediately aft of the transducer. This is marked by a punch in the deck weld at that location. Positive X means the point is forward of the RP, positive Y means the point is to starboard of the RP, positive Z means the point is below the RP. The loaded waterline is defined as the intersection of the vessel's performance wing with the hull at the transom.

Antenna Baseline Distance, m: 1.229
Transducer depth below waterline, m 0.62

RP to IMU	0.80	0.00	0.08
RP to Primary GPS Antenna	-3.55	-0.61	-1.88
RP to Vessel	0.16	0.00	0.77
RP to Sensor 1(MB transducer)	0.16	0.00	0.77
RP to Sensor 2	0	0	0
RP to Aux. GPS Antenna	0	0	0
RP to Heave lever arm(deg)	-0.67	0.00	0.00
IMU rotation Ref. Frame, deg	0	0	0
Sensor 1 rotation Ref. Frame, deg	0	0	0
Sensor 2 rotation Ref. Frame, deg	0	0	0

Roll offset: +0.5 deg
Pitch offset: 0.0 deg
Gyro offset: 0.0 deg

Time_Period_of_Content:
  Time_Period_Information:
    Range_of_Dates/Times:
      Beginning_Date: 20030823
      Ending_Date: 20030912
  Currentness_Reference: ground condition
Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: 145.595186
    East_Bounding_Coordinate: 145.706872
    North_Bounding_Coordinate: 15.251413
    South_Bounding_Coordinate: 15.118877

Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Gridded bathymetry
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Garapan Anchorage
Place_Keyword: Saipan
Place_Keyword: Commonwealth of the Northern Mariana Islands
Access_Constraints: None
Use_Constraints: These data are not to be used for navigation purposes.
Please acknowledge the NOAA Coral Reef Ecosystem Division,
Pacific Islands Fisheries Science Center as the source of this information.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Benthic Habitat Mapping Group,
Coral Reef Ecosystem Division, PIFSC,NOAA
Contact_Person: Joyce Miller
Contact_Address:
Address_Type: mailing and physical address
Address: 1125B Ala Moana Blvd
City: Honolulu
State_or_Province: HI
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-8303
Contact_Electronic_Mail_Address: joyce.miller@noaa.gov
Browse_Graphic:
Browse_Graphic_File_Name: saipan_anc-5.jpg
Browse_Graphic_File_Description: Gridded Bathymetry
Browse_Graphic_File_Type: JPEG
Data_Set_Credit: Benthic Habitat Mapping Group, Coral Reef Ecosystem Division
(CRED), Pacific Islands Fisheries Science Center (PIFSC), NOAA
Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report: Data are collected for resource management
and research purposes and are tested for internal consistency; however,
no effort is made to compare these data to external references or to
other published data.
Logical_Consistency_Report: Unspecified
Completeness_Report: Complete
Positional_Accuracy:

Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Horizontal positioning system: GPS SPS
Horizontal position accuracy: 5
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report:
Range resolution of sonar ~ 1.25 cm
Raw sounding resolution: 1 cm
Vertical accuracy of gridded product ~ 1 meter
Lineage:
Process_Step:
Process_Description:
Science Applications International Corporation's
(SAIC) ISS-2000 acquires, processes and records data, provides survey control and underway quality control displays. SAIC's SABER processing software is used to process the raw soundings, analyze the results, manually edit the sounding data to remove outliers and derive average gridded data values. GMT was then used to reformat the grid into final form. Interactive Visualization System's Fledermaus and ESRI ArcGIS were used for viewing results and creating browse objects.

The data have been corrected for observed tides from Guam tide gauge 1630000 with a time corrector of 18 minutes and a tide height multiplier of 0.94 using SABER postprocessing software. The data were also recorrected for observed sound velocities in postprocessing.

Software used:
SAIC ISS-2000 Acquisition Software, v 3.4 (20030610)
SAIC SABER Processing Software, v 2.0.2 (20030610)
GMT Generic Mapping Tools, v 3.4.2 (20021002)
Process_Date: 20040504
Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Raster
Raster_Object_Information:
Raster_Object_Type: Grid Cell
Row_Count: 2918
Column_Count: 2382
Vertical_Count: 1
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: row and column

```
      Coordinate_Representation:
        Abscissa_Resolution: 5
        Ordinate_Resolution: 5
      Planar_Distance_Units: meters
    Grid_Coordinate_System:
      Grid_Coordinate_System_Name: Universal Transverse Mercator
      Universal_Transverse_Mercator:
        UTM_Zone_Number: 55
        Transverse_Mercator:
          Scale_Factor_at_Central_Meridian: 0.9996
          Longitude_of_Central_Meridian: 147
          Latitude_of_Projection_Origin: 0
          False_Easting: 500000
          False_Northing: 0
  Geodetic_Model:
    Horizontal_Datum_Name: D_WGS_1984
    Ellipsoid_Name: WGS_1984
    Semi-major_Axis: 6378137.000000
    Denominator_of_Flattening_Ratio: 298.257224
Vertical_Coordinate_System_Definition:
  Depth_System_Definition:
    Depth_Datum_Name: mean lower low water
    Depth_Resolution:  0.01 meters
    Depth_Distance_Units: meters
    Depth_Encoding_Method: Attribute values
Entity_and_Attribute_Information:
  Overview_Description:
    Entity_and_Attribute_Overview:
      Depth values are real values based on the average of the
      soundings that fell within the extracted grid cells.  Number of
      soundings per grid cell range from >1000 soundings in shallow depths
      to as few as 20 soundings in deeper areas.  A total error budget for
      this survey has not been developed, therefore the accuracy of depth
      measurements should be considered to be within 1 meter.
    Entity_and_Attribute_Detail_Citation: none
Distribution_Information:
  Distributor:
    Contact_Information:
      Contact_Organization_Primary:
        Contact_Organization: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
        Contact_Person: Joyce E. Miller
      Contact_Position: Oceanographer
      Contact_Address:
```

Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-8303
Contact_Electronic_Mail_Address: joyce.miller@noaa.gov
Resource_Description: Downloadable Data
Distribution_Liability:
These data are not to be used for navigational purposes.
NOAA makes no warranty regarding these data, expressed or implied, nor does the fact of distribution constitute such a warranty. NOAA cannot assume liability for any damages caused by any errors or omissions in these data, nor as a result of the failure of these data to function on a particular system.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: ASCII ARC/INFO Grid
Format_Information_Content:
ASCII ARC/INFO grid
Files of this type can be imported with ArcToolbox 8.3 using the following path: Conversion Tools;Import to Raster;ASCII to Grid (Float).

These data as having the following header format and description

NCOLS xxx
NROWS xxx
XLLCORNER xxx
YLLCORNER xxx
CELLSIZE xxx
NODATA_VALUE xxx
ROW 1
ROW 2
.
.
.
ROW n
where:

NCOLS is the number of columns in the ASCII file.

NROWS is the number of rows in the ASCII file.
XLLCORNER is the x coordinate for lower left corner of the
lower left most cell in the grid.
YLLCORNER is the x coordinate for the lower left corner
of the lower left most cell in the grid.
CELLSIZE is the length of a cell's edge.
NODATA_VALUE is the value in the ASCII file representing
unknown values.
xxx are numbers, and the cell values are space delimited
File_Decompression_Technique: Zip file
Transfer_Size: 10.0
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name: ftp://ftp.soest.hawaii.edu/pibhmc/data/marianas/saipan_anc-5.asc.zip
Fees: None
Metadata_Reference_Information:
Metadata_Date: 20040701
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
Contact_Person: Dr. Michael Parke
Contact_Position: Research Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-7025
Contact_Electronic_Mail_Address: michael.parke@noaa.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Access_Constraints: None
Metadata_Use_Constraints: None

Identification_Information:
Citation:
Citation_Information:
Originator: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
Publication_Date: 20040629
Title: Gridded bathymetry of Tinian Island including Tatsumi Bank, Commonwealth of Northern Mariana Islands
Geospatial_Data_Presentation_Form: raster digital data
Online_Linkage: ftp://ftp.soest.hawaii.edu/pibhmc/data/marianas/tinian-5.asc.zip
Description:
Abstract: Gridded bathymetry of Tinian Island including Tatsumi Bank, Commonwealth of Northern Mariana Islands between 20 and 250 meters. Almost complete bottom coverage was achieved outside of Tinian Harbor, eastern Tinian and Tatsumi Bank. Off northwestern Tinian partial coverage was achieved to about 125 meters.
Purpose:
This grid was created using data gathered from multibeam soundings for use as a planning and reference document. Refer to supplemental information for description of instrument and survey.
Supplemental_Information:
Data were collected aboard the R/V AHI (Acoustic Habitat Investigator), a 25' survey launch owned and operated by the NOAA Pacific Islands Fisheries Science Center in Honolulu, HI. The R/V AHI's survey sensors include a 240 kHz RESON 8101-ER sonar providing bathymetry and imagery data, a TSS/Applanix POS/MV Model 320 which measures position, velocity, attitude and heading, and a Seabird SBE 19 CTD used to measure sound velocity profiles.

Equipment serial numbers and software versions are as follows:

RESON 8101-ER multibeam echosounder
DOC inventory #: CD0000537418
Firmware, dry: 8101-2.07-2D4D
Firmware, wet: 8101-1.06-2F6B

POS/MV Model 320, version 3
DOC inventory #: CD0000476647
PCS serial #: 474
IMU serial #: 203
Controller software: v 1.0.5.0

Seabird SBE19 CTD:

Serial #: 3029

R/V AHI Lever Arm Distances and Alignment Offsets
The R/V AHI Reference Point (RP) is defined to be the intersection of the vessel's centerline, the cabin deck and the bulkhead immediately aft of the transducer. This is marked by a punch in the deck weld at that location. Positive X means the point is forward of the RP, positive Y means the point is to starboard of the RP, positive Z means the point is below the RP. The loaded waterline is defined as the intersection of the vessel's performance wing with the hull at the transom.

Antenna Baseline Distance, m: 1.229
Transducer depth below waterline, m 0.62

RP to IMU	0.80	0.00	0.08
RP to Primary GPS Antenna	-3.55	-0.61	-1.88
RP to Vessel	0.16	0.00	0.77
RP to Sensor 1(MB transducer)	0.16	0.00	0.77
RP to Sensor 2	0	0	0
RP to Aux. GPS Antenna	0	0	0
RP to Heave lever arm(deg)	-0.67	0.00	0.00
IMU rotation Ref. Frame, deg	0	0	0
Sensor 1 rotation Ref. Frame, deg	0	0	0
Sensor 2 rotation Ref. Frame, deg	0	0	0

Roll offset: +0.5 deg
Pitch offset: 0.0 deg
Gyro offset: 0.0 deg

Time_Period_of_Content:
  Time_Period_Information:
    Range_of_Dates/Times:
      Beginning_Date: 20030823
      Ending_Date: 20030912
  Currentness_Reference: ground condition
Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: 145.57711
    East_Bounding_Coordinate: 145.72366

North_Bounding_Coordinate: 15.11779
South_Bounding_Coordinate: 14.888161
Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Gridded bathymetry
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Tinian
Place_Keyword: Tatsumi Bank
Place_Keyword: Commonwealth of Northern Mariana Islands
Access_Constraints: None
Use_Constraints: These data are not to be used for navigation purposes.
Please acknowledge the NOAA Coral Reef Ecosystem Division,
Pacific Islands Fisheries Science Center as the source of this information.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Benthic Habitat Mapping Group,
Coral Reef Ecosystem Division, PIFSC,NOAA
Contact_Person: Joyce Miller
Contact_Address:
Address_Type: mailing and physical address
Address: 1125B Ala Moana Blvd
City: Honolulu
State_or_Province: HI
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-8303
Contact_Electronic_Mail_Address: joyce.miller@noaa.gov
Browse_Graphic:
Browse_Graphic_File_Name: tinian-5.jpg
Browse_Graphic_File_Description: Gridded Bathymetry
Browse_Graphic_File_Type: JPEG
Data_Set_Credit: Benthic Habitat Mapping Group, Coral Reef Ecosystem Division
(CRED), Pacific Islands Fisheries Science Center (PIFSC), NOAA
Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report: Data are collected for resource management
and research purposes and are tested for internal consistency; however,
no effort is made to compare these data to external references or to
other published data.
Logical_Consistency_Report: Unspecified

Completeness_Report: Complete
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Horizontal positioning system: GPS SPS
Horizontal position accuracy: 5
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report:
Range resolution of sonar ~ 1.25 cm
Raw sounding resolution: 1 cm
Vertical accuracy of gridded product ~ 1 meter
Lineage:
Process_Step:
Process_Description:
Science Applications International Corporation's
(SAIC) ISS-2000 acquires, processes and records data, provides survey control and underway quality control displays. SAIC's SABER processing software is used to process the raw soundings, analyze the results, manually edit the sounding data to remove outliers and derive average gridded data values. GMT was then used to reformat the grid into final form. Interactive Visualization System's Fledermaus and ESRI ArcGIS were used for viewing results and creating browse objects.

The data have been corrected for observed tides from Guam tide gauge 1630000 with a time corrector of 18 minutes and a tide height multiplier of 0.94 using SABER postprocessing software. The data were also recorrected for observed sound velocities in postprocessing.

Software used:
SAIC ISS-2000 Acquisition Software, v 3.4 (20030610)
SAIC SABER Processing Software, v 2.0.2 (20030610)
GMT Generic Mapping Tools, v 3.4.2 (20021002)

Process_Date: 20040629
Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Raster
Raster_Object_Information:
Raster_Object_Type: Grid Cell
Row_Count: 5062
Column_Count: 3121
Vertical_Count: 1
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:

```
    Planar:
      Planar_Coordinate_Information:
        Planar_Coordinate_Encoding_Method: row and column
        Coordinate_Representation:
          Abscissa_Resolution: 5
          Ordinate_Resolution: 5
        Planar_Distance_Units: meters
      Grid_Coordinate_System:
        Grid_Coordinate_System_Name: Universal Transverse Mercator
        Universal_Transverse_Mercator:
          UTM_Zone_Number: 55
          Transverse_Mercator:
            Scale_Factor_at_Central_Meridian: 0.9996
            Longitude_of_Central_Meridian: 147
            Latitude_of_Projection_Origin: 0
            False_Easting: 500000
            False_Northing: 0
    Geodetic_Model:
      Horizontal_Datum_Name: D_WGS_1984
      Ellipsoid_Name: WGS_1984
      Semi-major_Axis: 6378137.000000
      Denominator_of_Flattening_Ratio: 298.257224
  Vertical_Coordinate_System_Definition:
    Depth_System_Definition:
      Depth_Datum_Name: mean lower low water
      Depth_Resolution:  0.01 meters
      Depth_Distance_Units: meters
      Depth_Encoding_Method: Attribute values
Entity_and_Attribute_Information:
  Overview_Description:
    Entity_and_Attribute_Overview:
      Depth values are real values based on the average of the
      soundings that fell within the extracted grid cells.  Number of
      soundings per grid cell range from >1000 soundings in shallow depths
      to as few as 20 soundings in deeper areas.  A total error budget for
      this survey has not been developed, therefore the accuracy of depth
      measurements should be considered to be within 1 meter.
    Entity_and_Attribute_Detail_Citation: none
Distribution_Information:
  Distributor:
    Contact_Information:
      Contact_Organization_Primary:
        Contact_Organization: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
```

Contact_Person: Joyce E. Miller
Contact_Position: Oceanographer
Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-8303
Contact_Electronic_Mail_Address: joyce.miller@noaa.gov
Resource_Description: Downloadable Data
Distribution_Liability:
These data are not to be used for navigational purposes.
NOAA makes no warranty regarding these data, expressed or implied, nor does the fact of distribution constitute such a warranty. NOAA cannot assume liability for any damages caused by any errors or omissions in these data, nor as a result of the failure of these data to function on a particular system.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: ASCII ARC/INFO Grid
Format_Information_Content:
ASCII ARC/INFO grid
Files of this type can be imported with ArcToolbox 8.3 using the following path: Conversion Tools;Import to Raster;ASCII to Grid (Float).

These data as having the following header format and description

NCOLS xxx
NROWS xxx
XLLCORNER xxx
YLLCORNER xxx
CELLSIZE xxx
NODATA_VALUE xxx
ROW 1
ROW 2
.
.
.
ROW n

where:

NCOLS is the number of columns in the ASCII file.
NROWS is the number of rows in the ASCII file.
XLLCORNER is the x coordinate for lower left corner of the lower left most cell in the grid.
YLLCORNER is the x coordinate for the lower left corner of the lower left most cell in the grid.
CELLSIZE is the length of a cell's edge.
NODATA_VALUE is the value in the ASCII file representing unknown values.
xxx are numbers, and the cell values are space delimited

File_Decompression_Technique: Zip file
Transfer_Size: 9.5
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name: ftp://ftp.soest.hawaii.edu/pibhmc/data/marianas/tinian-5.asc.zip
Fees: None
Metadata_Reference_Information:
Metadata_Date: 20040709
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
Contact_Person: Dr. Michael Parke
Contact_Position: Research Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-7025
Contact_Electronic_Mail_Address: michael.parke@noaa.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Access_Constraints: None
Metadata_Use_Constraints: None

Identification_Information:
Citation:
Citation_Information:
Originator: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
Publication_Date: 20040607
Title: Bathymetry grid of southeastern Rota, Sasanhaya Fish Preserve, Commonwealth of Northern Mariana Islands
Geospatial_Data_Presentation_Form: raster digital data
Online_Linkage: ftp://ftp.soest.hawaii.edu/pibhmc/data/marianas/rota_sw-5.asc.zip
Description:
Abstract: Gridded bathymetry of southwestern Rota, including Sasanhaya Fish Preserve, Commonwealth of Northern Mariana Islands. This survey includes almost complete bottom coverage of this area in depths between 20 and 250 meters.
Purpose:
This grid was created using data gathered from multibeam soundings for use as a planning and reference document. Refer to supplemental information for description of instrument and survey.
Supplemental_Information:
Data were collected aboard the R/V AHI (Acoustic Habitat Investigator), a 25' survey launch owned and operated by the NOAA Pacific Islands Fisheries Science Center in Honolulu, HI. The R/V AHI's survey sensors include a 240 kHz RESON 8101-ER sonar providing bathymetry and imagery data, a TSS/Applanix POS/MV Model 320 which measures position, velocity, attitude and heading, and a Seabird SBE 19 CTD used to measure sound velocity profiles.

Equipment serial numbers and software versions are as follows:

RESON 8101-ER multibeam echosounder
DOC inventory #: CD0000537418
Firmware, dry: 8101-2.07-2D4D
Firmware, wet: 8101-1.06-2F6B

POS/MV Model 320, version 3
DOC inventory #: CD0000476647
PCS serial #: 474
IMU serial #: 203
Controller software: v 1.0.5.0

Seabird SBE19 CTD:
Serial #: 3029

R/V AHI Lever Arm Distances and Alignment Offsets
The R/V AHI Reference Point (RP) is defined to be the intersection of the vessel's centerline, the cabin deck and the bulkhead immediately aft of the transducer. This is marked by a punch in the deck weld at that location. Positive X means the point is forward of the RP, positive Y means the point is to starboard of the RP, positive Z means the point is below the RP. The loaded waterline is defined as the intersection of the vessel's performance wing with the hull at the transom.

Antenna Baseline Distance, m: 1.229
Transducer depth below waterline, m 0.62

RP to IMU	0.80	0.00	0.08
RP to Primary GPS Antenna	-3.55	-0.61	-1.88
RP to Vessel	0.16	0.00	0.77
RP to Sensor 1(MB transducer)	0.16	0.00	0.77
RP to Sensor 2	0	0	0
RP to Aux. GPS Antenna	0	0	0
RP to Heave lever arm(deg)	-0.67	0.00	0.00
IMU rotation Ref. Frame, deg	0	0	0
Sensor 1 rotation Ref. Frame, deg	0	0	0
Sensor 2 rotation Ref. Frame, deg	0	0	0

Roll offset: +0.5 deg
Pitch offset: 0.0 deg
Gyro offset: 0.0 deg

Time_Period_of_Content:
  Time_Period_Information:
    Range_of_Dates/Times:
      Beginning_Date: 20030906
      Ending_Date: 20030907
  Currentness_Reference: ground condition
Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: 145.115762
    East_Bounding_Coordinate: 145.171183
    North_Bounding_Coordinate: 14.153463

South_Bounding_Coordinate: 14.101753
Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Gridded bathymetry
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Rota
Place_Keyword: Sasanhaya Fish Preserve
Place_Keyword: Commonwealth of Northern Mariana Islands
Access_Constraints: None
Use_Constraints: These data are not to be used for navigation purposes.
Please acknowledge the NOAA Coral Reef Ecosystem Division,
Pacific Islands Fisheries Science Center as the source of this information.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Benthic Habitat Mapping Group,
Coral Reef Ecosystem Division, PIFSC,NOAA
Contact_Person: Joyce Miller
Contact_Address:
Address_Type: mailing and physical address
Address: 1125B Ala Moana Blvd
City: Honolulu
State_or_Province: HI
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-8303
Contact_Electronic_Mail_Address: joyce.miller@noaa.gov
Browse_Graphic:
Browse_Graphic_File_Name: rota_sw-5.jpg
Browse_Graphic_File_Description: Gridded Bathymetry
Browse_Graphic_File_Type: JPEG
Data_Set_Credit: Benthic Habitat Mapping Group, Coral Reef Ecosystem Division
(CRED), Pacific Islands Fisheries Science Center (PIFSC), NOAA
Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report: Data are collected for resource management
and research purposes and are tested for internal consistency; however,
no effort is made to compare these data to external references or to
other published data.
Logical_Consistency_Report: Unspecified
Completeness_Report: Complete

Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Horizontal positioning system: GPS SPS
Horizontal position accuracy: 5
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report:
Range resolution of sonar ~ 1.25 cm
Raw sounding resolution: 1 cm
Vertical accuracy of gridded product ~ 1 meter
Lineage:
Process_Step:
Process_Description:
Science Applications International Corporation's
(SAIC) ISS-2000 acquires, processes and records data, provides survey control and underway quality control displays. SAIC's SABER processing software is used to process the raw soundings, analyze the results, manually edit the sounding data to remove outliers and derive average gridded data values. GMT was then used to reformat the grid into final form. Interactive Visualization System's Fledermaus and ESRI ArcGIS were used for viewing results and creating browse objects.

The data have been corrected for observed tides from Guam tide gauge 1630000. The data were recorrected for observed sound velocities in postprocessing.

Software used:
SAIC ISS-2000 Acquisition Software, v 3.4 (20030610)
SAIC SABER Processing Software, v 2.0.2 (20030610)
GMT Generic Mapping Tools, v 3.4.2 (20021002)

Process_Date: 20040603
Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Raster
Raster_Object_Information:
Raster_Object_Type: Grid Cell
Row_Count: 1135
Column_Count: 1188
Vertical_Count: 1
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Planar_Coordinate_Information:

Planar_Coordinate_Encoding_Method: row and column
Coordinate_Representation:
Abscissa_Resolution: 5
Ordinate_Resolution: 5
Planar_Distance_Units: meters
Grid_Coordinate_System:
Grid_Coordinate_System_Name: Universal Transverse Mercator
Universal_Transverse_Mercator:
UTM_Zone_Number: 55
Transverse_Mercator:
Scale_Factor_at_Central_Meridian: 0.9996
Longitude_of_Central_Meridian: 147
Latitude_of_Projection_Origin: 0
False_Easting: 0.9996
False_Northing: 0
Geodetic_Model:
Horizontal_Datum_Name: D_WGS_1984
Ellipsoid_Name: WGS_1984
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257224
Vertical_Coordinate_System_Definition:
Depth_System_Definition:
Depth_Datum_Name: mean lower low water
Depth_Resolution: 0.01 meters
Depth_Distance_Units: meters
Depth_Encoding_Method: Attribute values
Entity_and_Attribute_Information:
Overview_Description:
Entity_and_Attribute_Overview:
Depth values are real values based on the average of the
soundings that fell within the extracted grid cells. Number of
soundings per grid cell range from >1000 soundings in shallow depths
to as few as 20 soundings in deeper areas. A total error budget for
this survey has not been developed, therefore the accuracy of depth
measurements should be considered to be within 1 meter.
Entity_and_Attribute_Detail_Citation: none
Distribution_Information:
Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
Contact_Person: Joyce E. Miller
Contact_Position: Oceanographer

Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-8303
Contact_Electronic_Mail_Address: joyce.miller@noaa.gov
Resource_Description: Downloadable Data
Distribution_Liability:
These data are not to be used for navigational purposes.
NOAA makes no warranty regarding these data, expressed or implied, nor
does the fact of distribution constitute such a warranty. NOAA cannot
assume liability for any damages caused by any errors or omissions in
these data, nor as a result of the failure of these data to function
on a particular system.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: ASCII ARC/INFO Grid
Format_Information_Content:
ASCII ARC/INFO grid
Files of this type can be imported with ArcToolbox 8.3 using the
following path: Conversion Tools;Import to Raster;ASCII to Grid
(Float).

These data as having the following header format and description

NCOLS xxx
NROWS xxx
XLLCORNER xxx
YLLCORNER xxx
CELLSIZE xxx
NODATA_VALUE xxx
ROW 1
ROW 2
.
.
.
ROW n
where:

NCOLS is the number of columns in the ASCII file.
NROWS is the number of rows in the ASCII file.
XLLCORNER is the x coordinate for lower left corner of the lower left most cell in the grid.
YLLCORNER is the x coordinate for the lower left corner of the lower left most cell in the grid.
CELLSIZE is the length of a cell's edge.
NODATA_VALUE is the value in the ASCII file representing unknown values.
xxx are numbers, and the cell values are space delimited
File_Decompression_Technique: Zip file
Transfer_Size: 1.4
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name: ftp://ftp.soest.hawaii.edu/pibhmc/data/marianas/rota_sw-5.asc.zip
Fees: None
Metadata_Reference_Information:
Metadata_Date: 20040701
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
Contact_Person: Dr. Michael Parke
Contact_Position: Research Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-7025
Contact_Electronic_Mail_Address: michael.parke@noaa.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Access_Constraints: None
Metadata_Use_Constraints: None

Identification_Information:
Citation:
Citation_Information:
Originator: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
Publication_Date: 20040610
Title: Gridded bathymetry of Marpi Bank, Commonwealth of Northern Mariana Islands
Geospatial_Data_Presentation_Form: raster digital data
Online_Linkage: ftp://ftp.soest.hawaii.edu/pibhmc/data/marianas/marpi-5.asc.zip
Description:
Abstract: Gridded bathymetry of Marpi Bank, Commonwealth of Northern Mariana Islands. This survey achieved approximately 90% bottom coverage down to 200 meters.
Purpose:
This grid was created using data gathered from multibeam soundings for use as a planning and reference document. Refer to supplemental information for description of instrument and survey.
Supplemental_Information:
Data were collected aboard the R/V AHI (Acoustic Habitat Investigator), a 25' survey launch owned and operated by the NOAA Pacific Islands Fisheries Science Center in Honolulu, HI. The R/V AHI's survey sensors include a 240 kHz RESON 8101-ER sonar providing bathymetry and imagery data, a TSS/Applanix POS/MV Model 320 which measures position, velocity, attitude and heading, and a Seabird SBE 19 CTD used to measure sound velocity profiles.

Equipment serial numbers and software versions are as follows:

RESON 8101-ER multibeam echosounder
DOC inventory #: CD0000537418
Firmware, dry: 8101-2.07-2D4D
Firmware, wet: 8101-1.06-2F6B

POS/MV Model 320, version 3
DOC inventory #: CD0000476647
PCS serial #: 474
IMU serial #: 203
Controller software: v 1.0.5.0

Seabird SBE19 CTD:
Serial #: 3029

R/V AHI Lever Arm Distances and Alignment Offsets
The R/V AHI Reference Point (RP) is defined to be the intersection of the vessel's centerline, the cabin deck and the bulkhead immediately aft of the transducer. This is marked by a punch in the deck weld at that location. Positive X means the point is forward of the RP, positive Y means the point is to starboard of the RP, positive Z means the point is below the RP. The loaded waterline is defined as the intersection of the vessel's performance wing with the hull at the transom.

Antenna Baseline Distance, m: 1.229
Transducer depth below waterline, m 0.62

RP to IMU	0.80	0.00	0.08
RP to Primary GPS Antenna	-3.55	-0.61	-1.88
RP to Vessel	0.16	0.00	0.77
RP to Sensor 1(MB transducer)	0.16	0.00	0.77
RP to Sensor 2	0	0	0
RP to Aux. GPS Antenna	0	0	0
RP to Heave lever arm(deg)	-0.67	0.00	0.00
IMU rotation Ref. Frame, deg	0	0	0
Sensor 1 rotation Ref. Frame, deg	0	0	0
Sensor 2 rotation Ref. Frame, deg	0	0	0

Roll offset: +0.5 deg
Pitch offset: 0.0 deg
Gyro offset: 0.0 deg

Time_Period_of_Content:
  Time_Period_Information:
    Range_of_Dates/Times:
      Beginning_Date: 20030828
      Ending_Date: 20030828
  Currentness_Reference: ground condition
Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: 145.836493
    East_Bounding_Coordinate: 145.891634
    North_Bounding_Coordinate: 15.450298
    South_Bounding_Coordinate: 15.394246

Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Gridded bathymetry
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Marpi Bank
Place_Keyword: Saipan
Place_Keyword: Commonwealth of Northern Mariana Islands
Access_Constraints: None
Use_Constraints: These data are not to be used for navigation purposes.
Please acknowledge the NOAA Coral Reef Ecosystem Division,
Pacific Islands Fisheries Science Center as the source of this information.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Benthic Habitat Mapping Group,
Coral Reef Ecosystem Division, PIFSC,NOAA
Contact_Person: Joyce Miller
Contact_Address:
Address_Type: mailing and physical address
Address: 1125B Ala Moana Blvd
City: Honolulu
State_or_Province: HI
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-8303
Contact_Electronic_Mail_Address: joyce.miller@noaa.gov
Browse_Graphic:
Browse_Graphic_File_Name: marpi-5.jpg
Browse_Graphic_File_Description: Gridded Bathymetry
Browse_Graphic_File_Type: JPEG
Data_Set_Credit: Benthic Habitat Mapping Group, Coral Reef Ecosystem Division
(CRED), Pacific Islands Fisheries Science Center (PIFSC), NOAA
Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report: Data are collected for resource management
and research purposes and are tested for internal consistency; however,
no effort is made to compare these data to external references or to
other published data.
Logical_Consistency_Report: Unspecified
Completeness_Report: Complete
Positional_Accuracy:

```
    Horizontal_Positional_Accuracy:
      Horizontal_Positional_Accuracy_Report:
        Horizontal positioning system: GPS SPS
        Horizontal position accuracy: 5
    Vertical_Positional_Accuracy:
      Vertical_Positional_Accuracy_Report:
        Range resolution of sonar ~ 1.25 cm
        Raw sounding resolution: 1 cm
        Vertical accuracy of gridded product ~ 1 meter
  Lineage:
    Process_Step:
     Process_Description:
        Science Applications International Corporation's
        (SAIC) ISS-2000 acquires, processes and records data, provides survey
        control and underway quality control displays.  SAIC's SABER processing
        software is used to process the raw soundings, analyze the results,
        manually edit the sounding data to remove outliers and derive average
        gridded data values.  GMT was then used to reformat the grid into final
        form.  Interactive Visualization System's Fledermaus and ESRI ArcGIS
        were used for viewing results and creating browse objects.

        The data have been corrected for observed tides from Guam tide gauge
        1630000 with a time corrector of 18 minutes and a tide height multiplier
        of 0.94 using SABER postprocessing software.  The data were also
        recorrected for observed sound velocities in postprocessing.

        Software used:
        SAIC ISS-2000 Acquisition Software, v 3.4 (20030610)
        SAIC SABER Processing Software, v 3.4 (20030610)
        GMT Generic Mapping Tools, v 3.4.2 (20021002)

      Process_Date: 20040610
Spatial_Data_Organization_Information:
  Direct_Spatial_Reference_Method: Raster
  Raster_Object_Information:
    Raster_Object_Type: Grid Cell
    Row_Count: 1234
    Column_Count: 1177
    Vertical_Count: 1
Spatial_Reference_Information:
  Horizontal_Coordinate_System_Definition:
    Planar:
      Planar_Coordinate_Information:
```

```
      Planar_Coordinate_Encoding_Method: row and column
      Coordinate_Representation:
       Abscissa_Resolution: 5
       Ordinate_Resolution: {orders}
      Planar_Distance_Units: 5
    Grid_Coordinate_System:
      Grid_Coordinate_System_Name: Universal Transverse Mercator
      Universal_Transverse_Mercator:
       UTM_Zone_Number: 55
       Transverse_Mercator:
        Scale_Factor_at_Central_Meridian: 0.9996
        Longitude_of_Central_Meridian: 147
        Latitude_of_Projection_Origin: 0
        False_Easting: 500000
        False_Northing: 0
  Geodetic_Model:
    Horizontal_Datum_Name: D_WGS_1984
    Ellipsoid_Name: WGS_1984
    Semi-major_Axis: 6378137.000000
    Denominator_of_Flattening_Ratio: 298.257224
 Vertical_Coordinate_System_Definition:
  Depth_System_Definition:
    Depth_Datum_Name: mean lower low water
    Depth_Resolution:  0.01 meters
    Depth_Distance_Units: meters
    Depth_Encoding_Method: Attribute values
Entity_and_Attribute_Information:
 Overview_Description:
  Entity_and_Attribute_Overview:
    Depth values are real values based on the average of the
    soundings that fell within the extracted grid cells.  Number of
    soundings per grid cell range from >1000 soundings in shallow depths
    to as few as 20 soundings in deeper areas.  A total error budget for
    this survey has not been developed, therefore the accuracy of depth
    measurements should be considered to be within 1 meter.
  Entity_and_Attribute_Detail_Citation: none
Distribution_Information:
 Distributor:
  Contact_Information:
    Contact_Organization_Primary:
     Contact_Organization: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
     Contact_Person: Joyce E. Miller
    Contact_Position: Oceanographer
```

Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-8303
Contact_Electronic_Mail_Address: joyce.miller@noaa.gov
Resource_Description: Downloadable Data
Distribution_Liability:
These data are not to be used for navigational purposes.
NOAA makes no warranty regarding these data, expressed or implied, nor
does the fact of distribution constitute such a warranty. NOAA cannot
assume liability for any damages caused by any errors or omissions in
these data, nor as a result of the failure of these data to function
on a particular system.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: ASCII ARC/INFO Grid
Format_Information_Content:
ASCII ARC/INFO grid
Files of this type can be imported with ArcToolbox 8.3 using the
following path: Conversion Tools;Import to Raster;ASCII to Grid
(Float).

These data as having the following header format and description

NCOLS xxx
NROWS xxx
XLLCORNER xxx
YLLCORNER xxx
CELLSIZE xxx
NODATA_VALUE xxx
ROW 1
ROW 2
.
.
.
ROW n
where:

NCOLS is the number of columns in the ASCII file.
NROWS is the number of rows in the ASCII file.
XLLCORNER is the x coordinate for lower left corner of the
lower left most cell in the grid.
YLLCORNER is the x coordinate for the lower left corner
of the lower left most cell in the grid.
CELLSIZE is the length of a cell's edge.
NODATA_VALUE is the value in the ASCII file representing
unknown values.
xxx are numbers, and the cell values are space delimited
File_Decompression_Technique: Zip file
Transfer_Size: 2.4
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name: ftp://ftp.soest.hawaii.edu/pibhmc/data/marianas/marpi-5.asc.zip
Fees: None
Metadata_Reference_Information:
Metadata_Date: 20040701
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Benthic Habitat Mapping Group, CRED, PIFSC, NOAA
Contact_Person: Dr. Michael Parke
Contact_Position: Research Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-7025
Contact_Electronic_Mail_Address: michael.parke@noaa.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Access_Constraints: None
Metadata_Use_Constraints: None

Metadata: Backscatter

Identification_Information:
Citation:
Citation_Information:
Originator: Pacific Islands Benthic Habitat Mapping Center, CRED, PIFSC, NOAA
Publication_Date: 20050731
Title: Acoustic imagery extracted from gridded bathymetry of Guam Island in the Territory of Guam: AHI-03-07
Description:
Abstract: Backscatter extracted from gridded bathymetry of the banktops and shelf environments of Guam Island, Commonwealth of Northern Mariana Islands. Almost complete bottom coverage was achieved in depths between 20 and 250 meters, including the extensive banks of Garapan Anchorage.
Purpose:
This geotiff of acoustic imagery was created using data gathered from multibeam soundings for use as a planning and reference document. Refer to supplemental information for description of instrument and survey.
Supplemental_Information:
Data were collected aboard the R/V AHI (Acoustic Habitat Investigator), a 25’ survey launch owned and operated by the NOAA Pacific Islands Fisheries Science Center in Honolulu, HI. The R/V AHI’s survey sensors include a 240 kHz RESON 8101-ER sonar providing bathymetry and imagery data, a TSS/Applanix POS/MV Model 320 which measures position, velocity, attitude and heading, and a Seabird SBE 19 CTD used to measure sound velocity profiles.

Equipment serial numbers and software versions are as follows:

RESON 8101-ER multibeam echosounder
DOC inventory #: CD0000537418
Firmware, dry: 8101-2.07-2D4D
Firmware, wet: 8101-1.06-2F6B

POS/MV Model 320, version 3
DOC inventory #: CD0000476647
PCS serial #: 474
IMU serial #: 203
Controller software: v 1.0.5.0

Seabird SBE19 CTD:
Serial #: 3029

R/V AHI Lever Arm Distances and Alignment Offsets

The R/V AHI Reference Point (RP) is defined to be the intersection of the vessel's centerline, the cabin deck and the bulkhead immediately aft of the transducer. This is marked by a punch in the deck weld at that location. Positive X means the point is forward of the RP, positive Y means the point is to starboard of the RP, positive Z means the point is below the RP. The loaded waterline is defined as the intersection of the vessel's performance wing with the hull at the transom.

Antenna Baseline Distance, m: 1.229
Transducer depth below waterline, m 0.62

RP to IMU	0.80	0.00	0.08
RP to Primary GPS Antenna	-3.55	-0.61	-1.88
RP to Vessel	0.16	0.00	0.77
RP to Sensor 1(MB transducer)	0.16	0.00	0.77
RP to Sensor 2	0	0	0
RP to Aux. GPS Antenna	0	0	0
RP to Heave lever arm(deg)	-0.67	0.00	0.00
IMU rotation Ref. Frame, deg	0	0	0
Sensor 1 rotation Ref. Frame, deg	0	0	0
Sensor 2 rotation Ref. Frame, deg	0	0	0

Roll offset: +0.5 deg
Pitch offset: 0.0 deg
Gyro offset: 0.0 deg

Time_Period_of_Content:
  Time_Period_Information:
    Range_of_Dates/Times:
      Beginning_Date: 20030823
      Ending_Date: 20030912
  Currentness_Reference: ground condition
Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: 144.843324
    East_Bounding_Coordinate: 144.973913
    North_Bounding_Coordinate: 13.671329
    South_Bounding_Coordinate: 13.543463

Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Acoustic Imagery
Theme_Keyword: Backscatter
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Guam
Access_Constraints: None
Use_Constraints: These data are not to be used for navigation purposes.
Please acknowledge the NOAA Coral Reef Ecosystem Division,
Pacific Islands Fisheries Science Center and the Joint Institute for
Marine and Atmospheric Research (JIMAR) University of Hawaii
as the source of this information.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Pacific Islands Benthic Habitat Mapping Center (PIBHMC),
Coral Reef Ecosystem Division (CRED, Pacific Islands Fisheries Science
Center (PIFSC), National Oceanic and Atmospheric Administration (NOAA)
Contact_Person: Jonathan Weiss
Contact_Address:
Address_Type: mailing and physical address
Address: 1680 East West Road, POST 833
City: Honolulu
State_or_Province: HI
Postal_Code: 96822
Country: USA
Contact_Voice_Telephone: 808-956-2912
Contact_Electronic_Mail_Address: jonathan.weiss@noaa.gov
Browse_Graphic:
Browse_Graphic_File_Name: ahi0304-8-20.01.00m.ss.tif,
ahi0304-8-21.01.00m.ss.tif,
ahi0304-8-22.01.00m.ss.tif
Browse_Graphic_File_Description: Acoustic Imagery
Browse_Graphic_File_Type: GEOTIFF
Data_Set_Credit: PIBHMC, CRED, PIFSC, NOAA

Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report: Data are collected for resource management
and research purposes and are tested for internal consistency; however,
no effort is made to compare these data to external references or to

other published data.
Logical_Consistency_Report: Unspecified
Completeness_Report: Complete
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Horizontal positioning system: GPS SPS
Horizontal position accuracy: 1.0 meters
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report:
Range resolution of sonar ~ 1.25 cm
Raw sounding resolution: 1 cm
Vertical accuracy of gridded product ~ 1 meter

Lineage:
Process_Step:
Process_Description:
Science Applications International Corporation's (SAIC) ISS-2000 acquires, processes and records data, provides survey control and underway quality control displays. SAIC's SABER processing software is used to process the raw soundings, analyze the results, manually edit the sounding data to remove outliers and derive average gridded data values.

The data have been corrected for observed tides from Guam tide gauge 1630000 with a time corrector of 18 minutes and a tide height multiplier of 0.94 using SABER postprocessing software. The data were also recorrected for observed sound velocities in postprocessing.

Hawaii Mapping Research Group (HMRG) processing software was then used to extract values of acoustic intensity from the soundings. HMRG is an organization of scientists, engineers and technicians whose mission is to design, build, and operate tools for mapping the seafloor. HMRG is a group within the School of Ocean and Earth Science and Technology at the University of Hawaii at Manoa. The gsf2mr program (July, 2003) converts the swath bathymetry ping records contained within a GSF (Generic Sensor Format) version 2.02 dataset into mr1file format. This is done as follows: (i) position each beam's bottom detect intensity sample at the across-track location of that beam's bathymetry value; (ii) assuming a flat bottom in the near neighborhood of the beam, compute across-track distances for all of the beam's remaining intensity samples based on their temporal relation to the bottom detect sample and the computed average sound velocity for that beam as derived from its range and travel time; (iii) after all of the intensity samples from all beams of a ping have been located in across-track distance, fill the gaps between them as necessary by interpolation.

The conversion described above is necessary in order to run HMRG backscatter processing operations on the data, such as filtering to remove noise, and to create netCDF grids, raster images and geotiffs.

GMT was then used to reformat the acoustic imagery when necessary. Interactive Visualization System's Fledermaus, ESRI ArcGIS, and RSI ENVI were used for viewing results and creating browse objects.

Software used:
SAIC ISS-2000 Acquisition Software, v 3.4 (20030610)
SAIC SABER Processing Software, v 2.0.2 (20030610)
Hawaii Mapping Research Group (HMRG) Processing Software
GMT Generic Mapping Tools, v 3.4.2 (20021002)

Process_Date: 20050512

Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Raster
Raster_Object_Information:
Raster_Object_Type: Grid Cell
Row_Count: 6520
Column_Count: 7668
Vertical_Count: 1
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: row and column
Coordinate_Representation:
Abscissa_Resolution: 1
Ordinate_Resolution: 1
Planar_Distance_Units: meters
Grid_Coordinate_System:
Grid_Coordinate_System_Name: Universal Transverse Mercator
Universal_Transverse_Mercator:
UTM_Zone_Number: 55
Transverse_Mercator:
Scale_Factor_at_Central_Meridian: 9.9996
Longitude_of_Central_Meridian: 147
Latitude_of_Projection_Origin: 0
False_Easting: 500000
False_Northing: 0

Geodetic_Model:
Horizontal_Datum_Name: D_WGS_1984
Ellipsoid_Name: WGS_1984
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257224
Vertical_Coordinate_System_Definition:
Depth_System_Definition:
Depth_Datum_Name: mean lower low water
Depth_Resolution: 0.01 meters
Depth_Distance_Units: meters
Depth_Encoding_Method: Attribute values
Entity_and_Attribute_Information:
Overview_Description:
Entity_and_Attribute_Overview:
Sidescan data within a GSF file are arranged as small sequences of intensity values, one sequence per beam per ping. The intensity values represent the amplitude of echo returns to the sensor and can be related to seabed roughness.
Entity_and_Attribute_Detail_Citation: none

Distribution_Information:
Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: PIBHMC, CRED, PIFSC, NOAA and JIMAR
Contact_Person: Jonathan R. Weiss
Contact_Position: Seafloor Mapping Specialist
Contact_Address:
Address_Type: mailing and physical address
Address: 1680 East West Road, POST 833
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96822
Country: USA
Contact_Voice_Telephone: 808-956-2912
Contact_Electronic_Mail_Address: jonathan.weiss@noaa.gov
Resource_Description: Downloadable Data
Distribution_Liability:
These data are not to be used for navigational purposes.
NOAA makes no warranty regarding these data, expressed or implied, nor does the fact of distribution constitute such a warranty. NOAA cannot assume liability for any damages caused by any errors or omissions in these data, nor as a result of the failure of these data to function

on a particular system.
Standard_Order_Process:
Digital_Form: raster digital data
Digital_Transfer_Information:
Format_Name: Geotiff, .tif
Format_Information_Content:
GEOTIFF
Files of this type can be added to ArcInfo and ArcView 8.x or higher
and may be viewed in the Table of Contents as a new raster layer.
Files can also be viewed using Windows Picture and Fax viewer without
geogrphic information and in RSI's ENVI.
File_Decompression_Technique: none
Transfer_Size:
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name:
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-20.01.00m.ss.tif
W: 144.925 E: 144.985 N: 13.6131 S: 13.5433
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-21.01.00m.ss.tif
W: 144.905 E: 144.976 N: 13.6478 S: 13.5883
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-22.01.00m.ss.tif
W: 144.84 E: 144.91 N: 13.6762 S: 13.6167
Fees: None
Metadata_Reference_Information:
Metadata_Date: 20050520
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: PIBHMC, CRED, PIFSC, NOAA and JIMAR
Contact_Person: Dr. Michael Parke
Contact_Position: Research Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-7025
Contact_Electronic_Mail_Address: michael.parke@noaa.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Access_Constraints: None
Metadata_Use_Constraints: None

Identification_Information:
Citation:
Citation_Information:
Originator: Pacific Islands Benthic Habitat Mapping Center, CRED, PIFSC, NOAA
Publication_Date: 20050731
Title: Acoustic imagery extracted from gridded bathymetry of Commonwealth of Northern Mariana Islands: AHI-03-08
Description:
Abstract: Backscatter extracted from gridded bathymetry of the banktops and shelf environments of Saipan Island, Commonwealth of Northern Mariana Islands. Almost complete bottom coverage was achieved in depths between 20 and 250 meters, including the extensive banks of Garapan Anchorage.
Purpose:
This geotiff of acoustic imagery was created using data gathered from multibeam soundings for use as a planning and reference document. Refer to supplemental information for description of instrument and survey.
Supplemental_Information:
Data were collected aboard the R/V AHI (Acoustic Habitat Investigator), a 25’ survey launch owned and operated by the NOAA Pacific Islands Fisheries Science Center in Honolulu, HI. The R/V AHI’s survey sensors include a 240 kHz RESON 8101-ER sonar providing bathymetry and imagery data, a TSS/Applanix POS/MV Model 320 which measures position, velocity, attitude and heading, and a Seabird SBE 19 CTD used to measure sound velocity profiles.

Equipment serial numbers and software versions are as follows:

RESON 8101-ER multibeam echosounder
DOC inventory #: CD0000537418
Firmware, dry: 8101-2.07-2D4D
Firmware, wet: 8101-1.06-2F6B

POS/MV Model 320, version 3
DOC inventory #: CD0000476647
PCS serial #: 474
IMU serial #: 203
Controller software: v 1.0.5.0

Seabird SBE19 CTD:
Serial #: 3029

R/V AHI Lever Arm Distances and Alignment Offsets

The R/V AHI Reference Point (RP) is defined to be the intersection of the vessel's centerline, the cabin deck and the bulkhead immediately aft of the transducer. This is marked by a punch in the deck weld at that location. Positive X means the point is forward of the RP, positive Y means the point is to starboard of the RP, positive Z means the point is below the RP. The loaded waterline is defined as the intersection of the vessel's performance wing with the hull at the transom.

Antenna Baseline Distance, m: 1.229
Transducer depth below waterline, m 0.62

RP to IMU	0.80	0.00	0.08
RP to Primary GPS Antenna	-3.55	-0.61	-1.88
RP to Vessel	0.16	0.00	0.77
RP to Sensor 1(MB transducer)	0.16	0.00	0.77
RP to Sensor 2	0	0	0
RP to Aux. GPS Antenna	0	0	0
RP to Heave lever arm(deg)	-0.67	0.00	0.00
IMU rotation Ref. Frame, deg	0	0	0
Sensor 1 rotation Ref. Frame, deg	0	0	0
Sensor 2 rotation Ref. Frame, deg	0	0	0

Roll offset: +0.5 deg
Pitch offset: 0.0 deg
Gyro offset: 0.0 deg

Time_Period_of_Content:
  Time_Period_Information:
    Range_of_Dates/Times:
      Beginning_Date: 20030823
      Ending_Date: 20030912
  Currentness_Reference: ground condition
Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: 145.57453
    East_Bounding_Coordinate: 145.891634
    North_Bounding_Coordinate: 15.450298
    South_Bounding_Coordinate: 14.888161

Keywords:
  Theme:
    Theme_Keyword_Thesaurus: None
    Theme_Keyword: Acoustic Imagery
    Theme_Keyword: Backscatter
  Place:
    Place_Keyword_Thesaurus: None
    Place_Keyword: Garapan Anchorage
    Place_Keyword: Saipan
    Place_Keyword: Commonwealth of the Northern Mariana Islands
Access_Constraints: None
Use_Constraints: These data are not to be used for navigation purposes.
      Please acknowledge the NOAA Coral Reef Ecosystem Division,
      Pacific Islands Fisheries Science Center and the Joint Institute for
      Marine and Atmospheric Research (JIMAR) University of Hawaii
      as the source of this information.
Point_of_Contact:
  Contact_Information:
    Contact_Organization_Primary:
      Contact_Organization: Pacific Islands Benthic Habitat Mapping Center (PIBHMC),
            Coral Reef Ecosystem Division (CRED, Pacific Islands Fisheries Science
            Center (PIFSC), National Oceanic and Atmospheric Administration (NOAA)
      Contact_Person: Jonathan Weiss
    Contact_Address:
      Address_Type: mailing and physical address
      Address: 1680 East West Road, POST 833
      City: Honolulu
      State_or_Province: HI
      Postal_Code: 96822
      Country: USA
    Contact_Voice_Telephone: 808-956-2912
    Contact_Electronic_Mail_Address: jonathan.weiss@noaa.gov
Browse_Graphic:
  Browse_Graphic_File_Name: ahi0304-8-02.01.00m.ss.tif,
                             ahi0304-8-03.01.00m.ss.tif,
                             ahi0304-8-04.01.00m.ss.tif,
                             ahi0304-8-05.01.00m.ss.tif,
                             ahi0304-8-06.01.00m.ss.tif,
                             ahi0304-8-07.01.00m.ss.tif,
                             ahi0304-8-08.01.00m.ss.tif,
                             ahi0304-8-09.01.00m.ss.tif,
                             ahi0304-8-10.01.00m.ss.tif,
                             ahi0304-8-11.01.00m.ss.tif

Browse_Graphic_File_Description: Acoustic Imagery
Browse_Graphic_File_Type: GEOTIFF
Data_Set_Credit: PIBHMC, CRED, PIFSC, NOAA

Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report: Data are collected for resource management and research purposes and are tested for internal consistency; however, no effort is made to compare these data to external references or to other published data.
Logical_Consistency_Report: Unspecified
Completeness_Report: Complete
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Horizontal positioning system: GPS SPS
Horizontal position accuracy: 1.0 meters
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report:
Range resolution of sonar ~ 1.25 cm
Raw sounding resolution: 1 cm
Vertical accuracy of gridded product ~ 1 meter

Lineage:
Process_Step:
Process_Description:
Science Applications International Corporation's (SAIC) ISS-2000 acquires, processes and records data, provides survey control and underway quality control displays. SAIC's SABER processing software is used to process the raw soundings, analyze the results, manually edit the sounding data to remove outliers and derive average gridded data values.

The data have been corrected for observed tides from Guam tide gauge 1630000 with a time corrector of 18 minutes and a tide height multiplier of 0.94 using SABER postprocessing software. The data were also recorrected for observed sound velocities in postprocessing.

Hawaii Mapping Research Group (HMRG) processing software was then used to extract values of acoustic intensity from the soundings. HMRG is an organization of scientists, engineers and technicians whose mission is to design, build, and operate tools for mapping the seafloor. HMRG is a group within the School of Ocean and Earth Science and Technology at the University of Hawaii at Manoa. The gsf2mr program (July, 2003)

converts the swath bathymetry ping records contained within a GSF (Generic Sensor Format) version 2.02 dataset into mr1file format. This is done as follows: (i) position each beam's bottom detect intensity sample at the across-track location of that beam's bathymetry value; (ii) assuming a flat bottom in the near neighborhood of the beam, compute across-track distances for all of the beam's remaining intensity samples based on their temporal relation to the bottom detect sample and the computed average sound velocity for that beam as derived from its range and travel time; (iii) after all of the intensity samples from all beams of a ping have been located in across-track distance, fill the gaps between them as necessary by interpolation.

The conversion described above is necessary in order to run HMRG backscatter processing operations on the data, such as filtering to remove noise, and to create netCDF grids, raster images and geotiffs.

GMT was then used to reformat the acoustic imagery when necessary. Interactive Visualization System's Fledermaus, ESRI ArcGIS, and RSI ENVI were used for viewing results and creating browse objects.

Software used:
SAIC ISS-2000 Acquisition Software, v 3.4 (20030610)
SAIC SABER Processing Software, v 2.0.2 (20030610)
Hawaii Mapping Research Group (HMRG) Processing Software
GMT Generic Mapping Tools, v 3.4.2 (20021002)

Process_Date: 20050512

Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Raster
Raster_Object_Information:
Raster_Object_Type: Grid Cell
Row_Count: 6520
Column_Count: 7668
Vertical_Count: 1
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: row and column
Coordinate_Representation:
Abscissa_Resolution: 1
Ordinate_Resolution: 1
Planar_Distance_Units: meters
Grid_Coordinate_System:

Grid_Coordinate_System_Name: Universal Transverse Mercator
Universal_Transverse_Mercator:
UTM_Zone_Number: 55
Transverse_Mercator:
Scale_Factor_at_Central_Meridian: 9.9996
Longitude_of_Central_Meridian: 147
Latitude_of_Projection_Origin: 0
False_Easting: 500000
False_Northing: 0
Geodetic_Model:
Horizontal_Datum_Name: D_WGS_1984
Ellipsoid_Name: WGS_1984
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257224
Vertical_Coordinate_System_Definition:
Depth_System_Definition:
Depth_Datum_Name: mean lower low water
Depth_Resolution: 0.01 meters
Depth_Distance_Units: meters
Depth_Encoding_Method: Attribute values
Entity_and_Attribute_Information:
Overview_Description:
Entity_and_Attribute_Overview:
Sidescan data within a GSF file are arranged as small sequences of intensity values, one sequence per beam per ping. The intensity values represent the amplitude of echo returns to the sensor and can be related to seabed roughness.
Entity_and_Attribute_Detail_Citation: none

Distribution_Information:
Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: PIBHMC, CRED, PIFSC, NOAA and JIMAR
Contact_Person: Jonathan R. Weiss
Contact_Position: Seafloor Mapping Specialist
Contact_Address:
Address_Type: mailing and physical address
Address: 1680 East West Road, POST 833
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96822
Country: USA

Contact_Voice_Telephone: 808-956-2912
Contact_Electronic_Mail_Address: jonathan.weiss@noaa.gov
Resource_Description: Downloadable Data
Distribution_Liability:
These data are not to be used for navigational purposes.
NOAA makes no warranty regarding these data, expressed or implied, nor
does the fact of distribution constitute such a warranty. NOAA cannot
assume liability for any damages caused by any errors or omissions in
these data, nor as a result of the failure of these data to function
on a particular system.
Standard_Order_Process:
Digital_Form: raster digital data
Digital_Transfer_Information:
Format_Name: Geotiff, .tif
Format_Information_Content:
GEOTIFF
Files of this type can be added to ArcInfo and ArcView 8.x or higher
and may be viewed in the Table of Contents as a new raster layer.
Files can also be viewed using Windows Picture and Fax viewer without
geogrphic information and in RSI's ENVI.
File_Decompression_Technique: none
Transfer_Size:
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name:
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-02.01.00m.ss.tif
W: 145.573 E: 145.644 N: 15.2077 S: 15.1483
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-03.01.00m.ss.tif
W: 145.608 E: 145.679 N: 15.251 S: 15.1916
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-04.01.00m.ss.tif
W: 145.64 E: 145.711 N: 15.2118 S: 15.1525
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-05.01.00m.ss.tif
W: 145.675 E: 145.746 N: 15.2676 S: 15.2083
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-06.01.00m.ss.tif
W: 145.716 E: 145.787 N: 15.2893 S: 15.23
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-07.01.00m.ss.tif
W: 145.785 E: 145.845 N: 15.3046 S: 15.235
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-08.01.00m.ss.tif
W: 145.767 E: 145.827 N: 15.2404 S: 15.1708
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-09.01.00m.ss.tif
W: 145.739 E: 145.81 N: 15.1748 S: 15.1155

ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-10.01.00m.ss.tif
W: 145.696 E: 145.767 N: 15.1328 S: 15.0735
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-11.01.00m.ss.tif
W: 145.633 E: 145.704 N: 15.1559 S: 15.0966

Fees: None

Metadata_Reference_Information:
Metadata_Date: 20050520
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: PIBHMC, CRED, PIFSC, NOAA and JIMAR
Contact_Person: Dr. Michael Parke
Contact_Position: Research Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-7025
Contact_Electronic_Mail_Address: michael.parke@noaa.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Access_Constraints: None
Metadata_Use_Constraints: None

Identification_Information:
Citation:
Citation_Information:
Originator: Pacific Islands Benthic Habitat Mapping Center, CRED, PIFSC, NOAA
Publication_Date: 20050731
Title: Acoustic imagery extracted from gridded bathymetry of Commonwealth of Northern Mariana Islands: AHI-03-08
Description:
Abstract: Backscatter extracted from gridded bathymetry of the banktops and shelf environments of Tinian Island and Tatsumi, Commonwealth of Northern Mariana Islands.
Purpose:
This geotiff of acoustic imagery was created using data gathered from multibeam soundings for use as a planning and reference document. Refer to supplemental information for description of instrument and survey.
Supplemental_Information:
Data were collected aboard the R/V AHI (Acoustic Habitat Investigator), a 25’ survey launch owned and operated by the NOAA Pacific Islands Fisheries Science Center in Honolulu, HI. The R/V AHI’s survey sensors include a 240 kHz RESON 8101-ER sonar providing bathymetry and imagery data, a TSS/Applanix POS/MV Model 320 which measures position, velocity, attitude and heading, and a Seabird SBE 19 CTD used to measure sound velocity profiles.

Equipment serial numbers and software versions are as follows:

RESON 8101-ER multibeam echosounder
DOC inventory #: CD0000537418
Firmware, dry: 8101-2.07-2D4D
Firmware, wet: 8101-1.06-2F6B

POS/MV Model 320, version 3
DOC inventory #: CD0000476647
PCS serial #: 474
IMU serial #: 203
Controller software: v 1.0.5.0

Seabird SBE19 CTD:
Serial #: 3029

R/V AHI Lever Arm Distances and Alignment Offsets
The R/V AHI Reference Point (RP) is defined to be the intersection of the vessel's centerline, the cabin deck and the bulkhead immediately aft

of the transducer. This is marked by a punch in the deck weld at that location. Positive X means the point is forward of the RP, positive Y means the point is to starboard of the RP, positive Z means the point is below the RP. The loaded waterline is defined as the intersection of the vessel's performance wing with the hull at the transom.

Antenna Baseline Distance, m: 1.229
Transducer depth below waterline, m 0.62

RP to IMU	0.80	0.00	0.08
RP to Primary GPS Antenna	-3.55	-0.61	-1.88
RP to Vessel	0.16	0.00	0.77
RP to Sensor 1(MB transducer)	0.16	0.00	0.77
RP to Sensor 2	0	0	0
RP to Aux. GPS Antenna	0	0	0
RP to Heave lever arm(deg)	-0.67	0.00	0.00
IMU rotation Ref. Frame, deg	0	0	0
Sensor 1 rotation Ref. Frame, deg	0	0	0
Sensor 2 rotation Ref. Frame, deg	0	0	0

Roll offset: +0.5 deg
Pitch offset: 0.0 deg
Gyro offset: 0.0 deg

Time_Period_of_Content:
  Time_Period_Information:
    Range_of_Dates/Times:
      Beginning_Date: 20030823
      Ending_Date: 20030912
  Currentness_Reference: ground condition
Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: 145.57453
    East_Bounding_Coordinate: 145.891634
    North_Bounding_Coordinate: 15.450298
    South_Bounding_Coordinate: 14.888161

Keywords:
  Theme:

Theme_Keyword_Thesaurus: None
Theme_Keyword: Acoustic Imagery
Theme_Keyword: Backscatter
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Tinian Island
Place_Keyword: Tatsumi
Place_Keyword: Commonwealth of the Northern Mariana Islands
Access_Constraints: None
Use_Constraints: These data are not to be used for navigation purposes.
Please acknowledge the NOAA Coral Reef Ecosystem Division,
Pacific Islands Fisheries Science Center and the Joint Institute for
Marine and Atmospheric Research (JIMAR) University of Hawaii
as the source of this information.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Pacific Islands Benthic Habitat Mapping Center (PIBHMC),
Coral Reef Ecosystem Division (CRED, Pacific Islands Fisheries Science
Center (PIFSC), National Oceanic and Atmospheric Administration (NOAA)
Contact_Person: Jonathan Weiss
Contact_Address:
Address_Type: mailing and physical address
Address: 1680 East West Road, POST 833
City: Honolulu
State_or_Province: HI
Postal_Code: 96822
Country: USA
Contact_Voice_Telephone: 808-956-2912
Contact_Electronic_Mail_Address: jonathan.weiss@noaa.gov
Browse_Graphic:
Browse_Graphic_File_Name: ahi0304-8-12.01.00m.ss.tif,
ahi0304-8-13.01.00m.ss.tif,
ahi0304-8-14.01.00m.ss.tif,
ahi0304-8-15.01.00m.ss.tif,
ahi0304-8-16.01.00m.ss.tif,
ahi0304-8-17.01.00m.ss.tif,
ahi0304-8-18.01.00m.ss.tif
Browse_Graphic_File_Description: Acoustic Imagery
Browse_Graphic_File_Type: GEOTIFF
Data_Set_Credit: PIBHMC, CRED, PIFSC, NOAA

Data_Quality_Information:

Attribute_Accuracy:
Attribute_Accuracy_Report: Data are collected for resource management and research purposes and are tested for internal consistency; however, no effort is made to compare these data to external references or to other published data.
Logical_Consistency_Report: Unspecified
Completeness_Report: Complete
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Horizontal positioning system: GPS SPS
Horizontal position accuracy: 1.0 meters
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report:
Range resolution of sonar ~ 1.25 cm
Raw sounding resolution: 1 cm
Vertical accuracy of gridded product ~ 1 meter

Lineage:
Process_Step:
Process_Description:
Science Applications International Corporation's (SAIC) ISS-2000 acquires, processes and records data, provides survey control and underway quality control displays. SAIC's SABER processing software is used to process the raw soundings, analyze the results, manually edit the sounding data to remove outliers and derive average gridded data values.

The data have been corrected for observed tides from Guam tide gauge 1630000 with a time corrector of 18 minutes and a tide height multiplier of 0.94 using SABER postprocessing software. The data were also recorrected for observed sound velocities in postprocessing.

Hawaii Mapping Research Group (HMRG) processing software was then used to extract values of acoustic intensity from the soundings. HMRG is an organization of scientists, engineers and technicians whose mission is to design, build, and operate tools for mapping the seafloor. HMRG is a group within the School of Ocean and Earth Science and Technology at the University of Hawaii at Manoa. The gsf2mr program (July, 2003) converts the swath bathymetry ping records contained within a GSF (Generic Sensor Format) version 2.02 dataset into mr1file format. This is done as follows: (i) position each beam's bottom detect intensity sample at the across-track location of that beam's bathymetry value; (ii) assuming a flat bottom in the near neighborhood of the beam, compute across-track distances for all of the beam's remaining intensity samples based on their temporal relation to

the bottom detect sample and the computed average sound velocity for that beam as derived from its range and travel time; (iii) after all of the intensity samples from all beams of a ping have been located in across-track distance, fill the gaps between them as necessary by interpolation.

The conversion described above is necessary in order to run HMRG backscatter processing operations on the data, such as filtering to remove noise, and to create netCDF grids, raster images and geotiffs.

GMT was then used to reformat the acoustic imagery when necessary. Interactive Visualization System's Fledermaus, ESRI ArcGIS, and RSI ENVI were used for viewing results and creating browse objects.

Software used:
SAIC ISS-2000 Acquisition Software, v 3.4 (20030610)
SAIC SABER Processing Software, v 2.0.2 (20030610)
Hawaii Mapping Research Group (HMRG) Processing Software
GMT Generic Mapping Tools, v 3.4.2 (20021002)

Process_Date: 20050512

Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Raster
Raster_Object_Information:
Raster_Object_Type: Grid Cell
Row_Count: 6520
Column_Count: 7668
Vertical_Count: 1
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: row and column
Coordinate_Representation:
Abscissa_Resolution: 1
Ordinate_Resolution: 1
Planar_Distance_Units: meters
Grid_Coordinate_System:
Grid_Coordinate_System_Name: Universal Transverse Mercator
Universal_Transverse_Mercator:
UTM_Zone_Number: 55
Transverse_Mercator:
Scale_Factor_at_Central_Meridian: 9.9996

Longitude_of_Central_Meridian: 147
Latitude_of_Projection_Origin: 0
False_Easting: 500000
False_Northing: 0
Geodetic_Model:
Horizontal_Datum_Name: D_WGS_1984
Ellipsoid_Name: WGS_1984
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257224
Vertical_Coordinate_System_Definition:
Depth_System_Definition:
Depth_Datum_Name: mean lower low water
Depth_Resolution: 0.01 meters
Depth_Distance_Units: meters
Depth_Encoding_Method: Attribute values
Entity_and_Attribute_Information:
Overview_Description:
Entity_and_Attribute_Overview:
Sidescan data within a GSF file are arranged as small sequences of intensity values, one sequence per beam per ping. The intensity values represent the amplitude of echo returns to the sensor and can be related to seabed roughness.
Entity_and_Attribute_Detail_Citation: none

Distribution_Information:
Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: PIBHMC, CRED, PIFSC, NOAA and JIMAR
Contact_Person: Jonathan R. Weiss
Contact_Position: Seafloor Mapping Specialist
Contact_Address:
Address_Type: mailing and physical address
Address: 1680 East West Road, POST 833
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96822
Country: USA
Contact_Voice_Telephone: 808-956-2912
Contact_Electronic_Mail_Address: jonathan.weiss@noaa.gov
Resource_Description: Downloadable Data
Distribution_Liability:
These data are not to be used for navigational purposes.

NOAA makes no warranty regarding these data, expressed or implied, nor does the fact of distribution constitute such a warranty. NOAA cannot assume liability for any damages caused by any errors or omissions in these data, nor as a result of the failure of these data to function on a particular system.

Standard_Order_Process:
Digital_Form: raster digital data
Digital_Transfer_Information:
Format_Name: Geotiff, .tif
Format_Information_Content:
GEOTIFF
Files of this type can be added to ArcInfo and ArcView 8.x or higher and may be viewed in the Table of Contents as a new raster layer. Files can also be viewed using Windows Picture and Fax viewer without geogrphic information and in RSI's ENVI.
File_Decompression_Technique: none
Transfer_Size:
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name:
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-12.01.00m.ss.tif
W: 145.62 E: 145.68 N: 15.1197 S: 15.05
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-13.01.00m.ss.tif
W: 145.694 E: 145.633 N: 15.0697 S: 15
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-14.01.00m.ss.tif
W: 145.633 E: 145.693 N: 15.00. S: 14.9333
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-15.01.00m.ss.tif
W: 145.643 E: 145.714 N: 15.9363 S: 14.877
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-16.01.00m.ss.tif
W: 145.585 E: 145.645 N: 15.9797 S: 14.91
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-17.01.00m.ss.tif
W: 145.563 E: 145.623 N: 15.0447 S: 14.975
ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-18.01.00m.ss.tif
W: 145.571 E: 145.631 N: 15.098 S: 15.0283
Fees: None
Metadata_Reference_Information:
Metadata_Date: 20050520
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: PIBHMC, CRED, PIFSC, NOAA and JIMAR

Contact_Person: Dr. Michael Parke
Contact_Position: Research Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-7025
Contact_Electronic_Mail_Address: michael.parke@noaa.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Access_Constraints: None
Metadata_Use_Constraints: None

Identification_Information:
Citation:
Citation_Information:
Originator: Pacific Islands Benthic Habitat Mapping Center, CRED, PIFSC, NOAA
Publication_Date: 20050731
Title: Acoustic imagery extracted from gridded bathymetry of Commonwealth of Northern Mariana Islands: AHI-03-08
Description:
Abstract: Backscatter extracted from gridded bathymetry of the banktops and shelf environments of Rota Island, Commonwealth of Northern Mariana Islands.
Purpose:
This geotiff of acoustic imagery was created using data gathered from multibeam soundings for use as a planning and reference document. Refer to supplemental information for description of instrument and survey.
Supplemental_Information:
Data were collected aboard the R/V AHI (Acoustic Habitat Investigator), a 25’ survey launch owned and operated by the NOAA Pacific Islands Fisheries Science Center in Honolulu, HI. The R/V AHI’s survey sensors include a 240 kHz RESON 8101-ER sonar providing bathymetry and imagery data, a TSS/Applanix POS/MV Model 320 which measures position, velocity, attitude and heading, and a Seabird SBE 19 CTD used to measure sound velocity profiles.

Equipment serial numbers and software versions are as follows:

RESON 8101-ER multibeam echosounder
DOC inventory #: CD0000537418
Firmware, dry: 8101-2.07-2D4D
Firmware, wet: 8101-1.06-2F6B

POS/MV Model 320, version 3
DOC inventory #: CD0000476647
PCS serial #: 474
IMU serial #: 203
Controller software: v 1.0.5.0

Seabird SBE19 CTD:
Serial #: 3029

R/V AHI Lever Arm Distances and Alignment Offsets
The R/V AHI Reference Point (RP) is defined to be the intersection of the vessel's centerline, the cabin deck and the bulkhead immediately aft

of the transducer. This is marked by a punch in the deck weld at that location. Positive X means the point is forward of the RP, positive Y means the point is to starboard of the RP, positive Z means the point is below the RP. The loaded waterline is defined as the intersection of the vessel's performance wing with the hull at the transom.

Antenna Baseline Distance, m: 1.229
Transducer depth below waterline, m 0.62

RP to IMU	0.80	0.00	0.08
RP to Primary GPS Antenna	-3.55	-0.61	-1.88
RP to Vessel	0.16	0.00	0.77
RP to Sensor 1(MB transducer)	0.16	0.00	0.77
RP to Sensor 2	0	0	0
RP to Aux. GPS Antenna	0	0	0
RP to Heave lever arm(deg)	-0.67	0.00	0.00
IMU rotation Ref. Frame, deg	0	0	0
Sensor 1 rotation Ref. Frame, deg	0	0	0
Sensor 2 rotation Ref. Frame, deg	0	0	0

Roll offset: +0.5 deg
Pitch offset: 0.0 deg
Gyro offset: 0.0 deg

Time_Period_of_Content:
  Time_Period_Information:
    Range_of_Dates/Times:
      Beginning_Date: 20030823
      Ending_Date: 20030912
  Currentness_Reference: ground condition
Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: 145.113
    East_Bounding_Coordinate: 145.184
    North_Bounding_Coordinate: 14.1561
    South_Bounding_Coordinate: 14.0967
Keywords:
  Theme:
    Theme_Keyword_Thesaurus: None

Theme_Keyword: Acoustic Imagery
Theme_Keyword: Backscatter
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Rota
Place_Keyword: Commonwealth of the Northern Mariana Islands
Access_Constraints: None
Use_Constraints: These data are not to be used for navigation purposes.
Please acknowledge the NOAA Coral Reef Ecosystem Division,
Pacific Islands Fisheries Science Center as the source of this information.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Pacific Islands Benthic Habitat Mapping Center (PIBHMC),
Coral Reef Ecosystem Division (CRED, Pacific Islands Fisheries Science
Center (PIFSC), National Oceanic and Atmospheric Administration (NOAA)
Contact_Person: Jonathan Weiss
Contact_Address:
Address_Type: mailing and physical address
Address: 1680 East West Road, POST 833
City: Honolulu
State_or_Province: HI
Postal_Code: 96822
Country: USA
Contact_Voice_Telephone: 808-956-2912
Contact_Electronic_Mail_Address: jonathan.weiss@noaa.gov
Browse_Graphic:
Browse_Graphic_File_Name: ahi0304-8-19.01.00m.ss.tif
Browse_Graphic_File_Description: Acoustic Imagery
Browse_Graphic_File_Type: GEOTIFF
Data_Set_Credit: PIBHMC, CRED, PIFSC, NOAA

Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report: Data are collected for resource management
and research purposes and are tested for internal consistency; however,
no effort is made to compare these data to external references or to
other published data.
Logical_Consistency_Report: Unspecified
Completeness_Report: Complete
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:

Horizontal positioning system: GPS SPS
Horizontal position accuracy: 1.0 meters
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report:
Range resolution of sonar ~ 1.25 cm
Raw sounding resolution: 1 cm
Vertical accuracy of gridded product ~ 1 meter

Lineage:
Process_Step:
Process_Description:
Science Applications International Corporation's (SAIC) ISS-2000 acquires, processes and records data, provides survey control and underway quality control displays. SAIC's SABER processing software is used to process the raw soundings, analyze the results, manually edit the sounding data to remove outliers and derive average gridded data values.

The data have been corrected for observed tides from Guam tide gauge 1630000 with a time corrector of 18 minutes and a tide height multiplier of 0.94 using SABER postprocessing software. The data were also recorrected for observed sound velocities in postprocessing.

Hawaii Mapping Research Group (HMRG) processing software was then used to extract values of acoustic intensity from the soundings. HMRG is an organization of scientists, engineers and technicians whose mission is to design, build, and operate tools for mapping the seafloor. HMRG is a group within the School of Ocean and Earth Science and Technology at the University of Hawaii at Manoa. The gsf2mr program (July, 2003) converts the swath bathymetry ping records contained within a GSF (Generic Sensor Format) version 2.02 dataset into mr1file format. This is done as follows: (i) position each beam's bottom detect intensity sample at the across-track location of that beam's bathymetry value; (ii) assuming a flat bottom in the near neighborhood of the beam, compute across-track distances for all of the beam's remaining intensity samples based on their temporal relation to the bottom detect sample and the computed average sound velocity for that beam as derived from its range and travel time; (iii) after all of the intensity samples from all beams of a ping have been located in across-track distance, fill the gaps between them as necessary by interpolation.

The conversion described above is necessary in order to run HMRG backscatter processing operations on the data, such as filtering to remove noise, and to create netCDF grids, raster images and geotiffs.

GMT was then used to reformat the acoustic imagery when necessary. Interactive

Visualization System's Fledermaus, ESRI ArcGIS, and RSI ENVI were used for viewing results and creating browse objects.

Software used:
SAIC ISS-2000 Acquisition Software, v 3.4 (20030610)
SAIC SABER Processing Software, v 2.0.2 (20030610)
Hawaii Mapping Research Group (HMRG) Processing Software
GMT Generic Mapping Tools, v 3.4.2 (20021002)

Process_Date: 20050512

Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Raster
Raster_Object_Information:
Raster_Object_Type: Grid Cell
Row_Count: 6520
Column_Count: 7668
Vertical_Count: 1
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: row and column
Coordinate_Representation:
Abscissa_Resolution: 1
Ordinate_Resolution: 1
Planar_Distance_Units: meters
Grid_Coordinate_System:
Grid_Coordinate_System_Name: Universal Transverse Mercator
Universal_Transverse_Mercator:
UTM_Zone_Number: 55
Transverse_Mercator:
Scale_Factor_at_Central_Meridian: 9.9996
Longitude_of_Central_Meridian: 147
Latitude_of_Projection_Origin: 0
False_Easting: 500000
False_Northing: 0
Geodetic_Model:
Horizontal_Datum_Name: D_WGS_1984
Ellipsoid_Name: WGS_1984
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257224
Vertical_Coordinate_System_Definition:

Depth_System_Definition:
Depth_Datum_Name: mean lower low water
Depth_Resolution: 0.01 meters
Depth_Distance_Units: meters
Depth_Encoding_Method: Attribute values
Entity_and_Attribute_Information:
Overview_Description:
Entity_and_Attribute_Overview:
Sidescan data within a GSF file are arranged as small sequences of intensity values, one sequence per beam per ping. The intensity values represent the amplitude of echo returns to the sensor and can be related to seabed roughness.
Entity_and_Attribute_Detail_Citation: none

Distribution_Information:
Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: PIBHMC, CRED, PIFSC, NOAA
Contact_Person: Jonathan R. Weiss
Contact_Position: Seafloor Mapping Specialist
Contact_Address:
Address_Type: mailing and physical address
Address: 1680 East West Road, POST 833
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96822
Country: USA
Contact_Voice_Telephone: 808-956-2912
Contact_Electronic_Mail_Address: jonathan.weiss@noaa.gov
Resource_Description: Downloadable Data
Distribution_Liability:
These data are not to be used for navigational purposes.
NOAA makes no warranty regarding these data, expressed or implied, nor does the fact of distribution constitute such a warranty. NOAA cannot assume liability for any damages caused by any errors or omissions in these data, nor as a result of the failure of these data to function on a particular system.
Standard_Order_Process:
Digital_Form: raster digital data
Digital_Transfer_Information:
Format_Name: Geotiff, .tif
Format_Information_Content:

GEOTIFF
Files of this type can be added to ArcInfo and ArcView 8.x or higher
and may be viewed in the Table of Contents as a new raster layer.
Files can also be viewed using Windows Picture and Fax viewer without
geogrphic information and in RSI's ENVI.
File_Decompression_Technique: none
Transfer_Size: 7.7 MB
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name: ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-19.01.00m.ss.tif

Fees: None
Metadata_Reference_Information:
Metadata_Date: 20050520
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: PIBHMC, CRED, PIFSC, NOAA
Contact_Person: Dr. Michael Parke
Contact_Position: Research Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-7025
Contact_Electronic_Mail_Address: michael.parke@noaa.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Access_Constraints: None
Metadata_Use_Constraints: None

Identification_Information:
Citation:
Citation_Information:
Originator: Pacific Islands Benthic Habitat Mapping Center, CRED, PIFSC, NOAA
Publication_Date: 20050731
Title: Acoustic imagery extracted from gridded bathymetry of Commonwealth of Northern Mariana Islands: AHI-03-08
Description:
Abstract: Backscatter extracted from gridded bathymetry of the banktops and shelf environments of Marpi, Commonwealth of Northern Mariana Islands.
Purpose:
This geotiff of acoustic imagery was created using data gathered from multibeam soundings for use as a planning and reference document. Refer to supplemental information for description of instrument and survey.
Supplemental_Information:
Data were collected aboard the R/V AHI (Acoustic Habitat Investigator), a 25’ survey launch owned and operated by the NOAA Pacific Islands Fisheries Science Center in Honolulu, HI. The R/V AHI’s survey sensors include a 240 kHz RESON 8101-ER sonar providing bathymetry and imagery data, a TSS/Applanix POS/MV Model 320 which measures position, velocity, attitude and heading, and a Seabird SBE 19 CTD used to measure sound velocity profiles.

Equipment serial numbers and software versions are as follows:

RESON 8101-ER multibeam echosounder
DOC inventory #: CD0000537418
Firmware, dry: 8101-2.07-2D4D
Firmware, wet: 8101-1.06-2F6B

POS/MV Model 320, version 3
DOC inventory #: CD0000476647
PCS serial #: 474
IMU serial #: 203
Controller software: v 1.0.5.0

Seabird SBE19 CTD:
Serial #: 3029

R/V AHI Lever Arm Distances and Alignment Offsets
The R/V AHI Reference Point (RP) is defined to be the intersection of the vessel's centerline, the cabin deck and the bulkhead immediately aft

of the transducer. This is marked by a punch in the deck weld at that location. Positive X means the point is forward of the RP, positive Y means the point is to starboard of the RP, positive Z means the point is below the RP. The loaded waterline is defined as the intersection of the vessel's performance wing with the hull at the transom.

Antenna Baseline Distance, m: 1.229
Transducer depth below waterline, m 0.62

RP to IMU	0.80	0.00	0.08
RP to Primary GPS Antenna	-3.55	-0.61	-1.88
RP to Vessel	0.16	0.00	0.77
RP to Sensor 1(MB transducer)	0.16	0.00	0.77
RP to Sensor 2	0	0	0
RP to Aux. GPS Antenna	0	0	0
RP to Heave lever arm(deg)	-0.67	0.00	0.00
IMU rotation Ref. Frame, deg	0	0	0
Sensor 1 rotation Ref. Frame, deg	0	0	0
Sensor 2 rotation Ref. Frame, deg	0	0	0

Roll offset: +0.5 deg
Pitch offset: 0.0 deg
Gyro offset: 0.0 deg

Time_Period_of_Content:
  Time_Period_Information:
    Range_of_Dates/Times:
      Beginning_Date: 20030823
      Ending_Date: 20030912
  Currentness_Reference: ground condition
Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: 145.833
    East_Bounding_Coordinate: 145.894
    North_Bounding_Coordinate: 15.4571
    South_Bounding_Coordinate: 15.3875
Keywords:
  Theme:
    Theme_Keyword_Thesaurus: None

Theme_Keyword: Acoustic Imagery
Theme_Keyword: Backscatter
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Rota
Place_Keyword: Commonwealth of the Northern Mariana Islands
Access_Constraints: None
Use_Constraints: These data are not to be used for navigation purposes.
Please acknowledge the NOAA Coral Reef Ecosystem Division,
Pacific Islands Fisheries Science Center as the source of this information.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Pacific Islands Benthic Habitat Mapping Center (PIBHMC),
Coral Reef Ecosystem Division (CRED, Pacific Islands Fisheries Science
Center (PIFSC), National Oceanic and Atmospheric Administration (NOAA)
Contact_Person: Jonathan Weiss
Contact_Address:
Address_Type: mailing and physical address
Address: 1680 East West Road, POST 833
City: Honolulu
State_or_Province: HI
Postal_Code: 96822
Country: USA
Contact_Voice_Telephone: 808-956-2912
Contact_Electronic_Mail_Address: jonathan.weiss@noaa.gov
Browse_Graphic:
Browse_Graphic_File_Name: ahi0304-8-01.01.00m.ss.tif
Browse_Graphic_File_Description: Acoustic Imagery
Browse_Graphic_File_Type: GEOTIFF
Data_Set_Credit: PIBHMC, CRED, PIFSC, NOAA

Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report: Data are collected for resource management
and research purposes and are tested for internal consistency; however,
no effort is made to compare these data to external references or to
other published data.
Logical_Consistency_Report: Unspecified
Completeness_Report: Complete
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:

Horizontal positioning system: GPS SPS
Horizontal position accuracy: 1.0 meters
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report:
Range resolution of sonar ~ 1.25 cm
Raw sounding resolution: 1 cm
Vertical accuracy of gridded product ~ 1 meter

Lineage:
Process_Step:
Process_Description:
Science Applications International Corporation's (SAIC) ISS-2000 acquires, processes and records data, provides survey control and underway quality control displays. SAIC's SABER processing software is used to process the raw soundings, analyze the results, manually edit the sounding data to remove outliers and derive average gridded data values.

The data have been corrected for observed tides from Guam tide gauge 1630000 with a time corrector of 18 minutes and a tide height multiplier of 0.94 using SABER postprocessing software. The data were also recorrected for observed sound velocities in postprocessing.

Hawaii Mapping Research Group (HMRG) processing software was then used to extract values of acoustic intensity from the soundings. HMRG is an organization of scientists, engineers and technicians whose mission is to design, build, and operate tools for mapping the seafloor. HMRG is a group within the School of Ocean and Earth Science and Technology at the University of Hawaii at Manoa. The gsf2mr program (July, 2003) converts the swath bathymetry ping records contained within a GSF (Generic Sensor Format) version 2.02 dataset into mr1file format. This is done as follows: (i) position each beam's bottom detect intensity sample at the across-track location of that beam's bathymetry value; (ii) assuming a flat bottom in the near neighborhood of the beam, compute across-track distances for all of the beam's remaining intensity samples based on their temporal relation to the bottom detect sample and the computed average sound velocity for that beam as derived from its range and travel time; (iii) after all of the intensity samples from all beams of a ping have been located in across-track distance, fill the gaps between them as necessary by interpolation.

The conversion described above is necessary in order to run HMRG backscatter processing operations on the data, such as filtering to remove noise, and to create netCDF grids, raster images and geotiffs.

GMT was then used to reformat the acoustic imagery when necessary. Interactive

Visualization System's Fledermaus, ESRI ArcGIS, and RSI ENVI were used for viewing results and creating browse objects.

Software used:
SAIC ISS-2000 Acquisition Software, v 3.4 (20030610)
SAIC SABER Processing Software, v 2.0.2 (20030610)
Hawaii Mapping Research Group (HMRG) Processing Software
GMT Generic Mapping Tools, v 3.4.2 (20021002)

Process_Date: 20050512

Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Raster
Raster_Object_Information:
Raster_Object_Type: Grid Cell
Row_Count: 6520
Column_Count: 7668
Vertical_Count: 1
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: row and column
Coordinate_Representation:
Abscissa_Resolution: 1
Ordinate_Resolution: 1
Planar_Distance_Units: meters
Grid_Coordinate_System:
Grid_Coordinate_System_Name: Universal Transverse Mercator
Universal_Transverse_Mercator:
UTM_Zone_Number: 55
Transverse_Mercator:
Scale_Factor_at_Central_Meridian: 9.9996
Longitude_of_Central_Meridian: 147
Latitude_of_Projection_Origin: 0
False_Easting: 500000
False_Northing: 0
Geodetic_Model:
Horizontal_Datum_Name: D_WGS_1984
Ellipsoid_Name: WGS_1984
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257224
Vertical_Coordinate_System_Definition:

Depth_System_Definition:
Depth_Datum_Name: mean lower low water
Depth_Resolution: 0.01 meters
Depth_Distance_Units: meters
Depth_Encoding_Method: Attribute values
Entity_and_Attribute_Information:
Overview_Description:
Entity_and_Attribute_Overview:
Sidescan data within a GSF file are arranged as small sequences of intensity values, one sequence per beam per ping. The intensity values represent the amplitude of echo returns to the sensor and can be related to seabed roughness.
Entity_and_Attribute_Detail_Citation: none

Distribution_Information:
Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: PIBHMC, CRED, PIFSC, NOAA
Contact_Person: Jonathan R. Weiss
Contact_Position: Seafloor Mapping Specialist
Contact_Address:
Address_Type: mailing and physical address
Address: 1680 East West Road, POST 833
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96822
Country: USA
Contact_Voice_Telephone: 808-956-2912
Contact_Electronic_Mail_Address: jonathan.weiss@noaa.gov
Resource_Description: Downloadable Data
Distribution_Liability:
These data are not to be used for navigational purposes.
NOAA makes no warranty regarding these data, expressed or implied, nor does the fact of distribution constitute such a warranty. NOAA cannot assume liability for any damages caused by any errors or omissions in these data, nor as a result of the failure of these data to function on a particular system.
Standard_Order_Process:
Digital_Form: raster digital data
Digital_Transfer_Information:
Format_Name: Geotiff, .tif
Format_Information_Content:

GEOTIFF
Files of this type can be added to ArcInfo and ArcView 8.x or higher
and may be viewed in the Table of Contents as a new raster layer.
Files can also be viewed using Windows Picture and Fax viewer without
geogrphic information and in RSI's ENVI.
File_Decompression_Technique: none
Transfer_Size: 7.7 MB
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name: ftp://ftp.soest.hawaii.edu/pibhmc/data/cnmi/backscatter/ahi0304-8-01.01.00m.ss.tif

Fees: None
Metadata_Reference_Information:
Metadata_Date: 20050520
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: PIBHMC, CRED, PIFSC, NOAA
Contact_Person: Dr. Michael Parke
Contact_Position: Research Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 1125 'B' Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: 808-592-7025
Contact_Electronic_Mail_Address: michael.parke@noaa.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Access_Constraints: None
Metadata_Use_Constraints: None

Metadata:
Cruise

Identification_Information:
Citation:
Citation_Information:
Originator: Joyce E. Miller
Publication_Date: 20060907
Title: Reson 8101ER Multibeam Sonar Data from Cruise
OES-03-07/AHI-03-07, Data Set Name Guam.
Geospatial_Data_Presentation_Form:
Generic Sensor Format (GSF) digital data
Online_Linkage: http://soest.hawaii.edu/pibhmc
Description:
Abstract: Reson 8101ER multibeam Data were collected between 22-26 September 2003 (JD 265-269) aboard NOAA Survey Launch Acoustic Habitat Investigator (AHI) at Guam Island in the Territory of Guam in the Western Pacific during cruise OES-03-07/AHI-03-07. The AHI was deployed independently from the NOAA Ship Oscar Elton Sette (OES) during the cruise.

The multibeam data were logged into data set Guam and collected using SAIC ISS-2000 software in the Generic Sensor Format and processed using SABER editing software. Sound velocity corrections from a Seabird SBE19 CTD sensor and motion corrections from a POS-MV vertical reference were applied to the data in real time. Predicted tides were applied to the data in real time and observed tides from Guam tide gauge 1630000 were applied using SABER postprocessing software.

Horizontal accuracy is 20m (no differential GPS correctors applied), vertical accuracy is depth dependent (~1% of water depth), WGS84 datum. These data are not to be used for navigation. Depths mapped range from ~10 - 300 m.

Purpose: The data were collected in support of Coral Reef Conservation Program goals to map all shallow (0-30 m)coral reefs in US Pacific waters and priority moderate (> 30 m) depth areas by 2009. The data are being used to provide bathymetric and backscatter data for previously unmapped areas; in support of ecosystem management requirements for benthic habitat mapping and location of Essential Fish Habitat; and to study the geologic features of the area.

Supplemental_Information:
Data were collected aboard the R/V AHI (Acoustic Habitat Investigator), a 8 m (25') survey launch owned and operated by the NOAA Pacific Islands Fisheries Science Center in Honolulu, HI. The R/V AHI's survey sensors include a 240 kHz RESON 8101-ER sonar which measures bathymetry and acoustic backscatter imagery, a TSS/Applanix POS/MV Model 320 which measures time, position, velocity, attitude and heading, and a Seabird SBE 19 CTD used to measure sound velocity profiles.

The AHI's equipment serial numbers, software versions and sensor configuration settings are as follows:

RESON 8101-ER multibeam echosounder
DOC inventory #: CD0000537418
Transducer serial #: 201004
Firmware, dry: 8101-2.07-2D4D
Firmware, wet: 8101-1.06-2F6B

R/V AHI POS/MV Model 320, version 3
DOC inventory #: CD0000476647
PCS serial #: 474
IMU serial #: 203
Controller software: v 1.0.5.0
PCS Firmware: 2.16

Seabird SBE19 CTD:
Serial #: 3029

R/V AHI Lever Arm Distances and Alignment Offsets
The R/V AHI Reference Point (RP) is defined to be the intersection of the vessel's centerline, the cabin deck and the bulkhead immediately aft of the transducer. This is marked by a punch in the deck weld at that location. Positive X means the point is forward of the RP, positive Y means the point is to starboard of the RP, positive Z means the point is below the RP. The loaded waterline is defined as the intersection of the vessel's performance wing with the hull at the transom.

Antenna Baseline Distance, m: 1.229
Transducer depth below waterline, m 0.62

RP to IMU 0.80 0.00 0.08

RP to Primary GPS Antenna -3.55 -0.61 -1.88
RP to Vessel 0.16 0.00 0.77
RP to Sensor 1(MB transducer) 0.16 0.00 0.77
RP to Sensor 2 0 0 0
RP to Aux. GPS Antenna 0 0 0
RP to Heave lever arm(deg) -0.67 0.00 0.00
IMU rotation Ref. Frame, deg 0 0 0
Sensor 1 rotation Ref. Frame, deg 0 0 0
Sensor 2 rotation Ref. Frame, deg 0 0 0

Roll offset: +0.5 deg
Pitch offset: 0.0 deg
Gyro offset: 0.0 deg

Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 20030922
Ending_Date: 20030926
Currentness_Reference: ground condition
Status:
Progress: In Work
Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: 144.843324
East_Bounding_Coordinate: 144.973913
North_Bounding_Coordinate: 13.671329
South_Bounding_Coordinate: 13.543463
Keywords:
Theme:
Theme_Keyword_Thesaurus: CoRIS Theme Thesaurus Version 1.0
Theme_Keyword: EARTH SCIENCE > Oceans > Bathymetry/Seafloor Topography > Bathymetry
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Bathymetry
Theme_Keyword: Multibeam sonar
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Guam Island
Place_Keyword: Pati Point Preserve
Place_Keyword: Territory of Guam
Place_Keyword: Islands

Place:
Place_Keyword_Thesaurus: CoRIS Place Thesaurus Version 1.0
Place_Keyword: OCEAN BASIN > Pacific Ocean > Western Pacific Ocean > Territory of Guam > Guam > Pati Point Preserve >Islands
Place_Keyword: COUNTRY/TERRITORY > United States of America > Hawaii > Honolulu
Access_Constraints: None.
Use_Constraints: These data are NOT TO BE USED FOR NAVIGATION
Point_of_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Joyce E. Miller
Contact_Organization: Coral Reef Ecosystem Division,
Pacific Islands Fisheries Science Center
Contact_Position: Oceanographer
Contact_Address:
Address_Type: mailing and physical address
Address: Kewalo Research Facility, 1125B Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: (808) 956-5239
Contact_Facsimile_Telephone: (808) 983-3730
Data_Set_Credit: Coral Reef Ecosystem Division, NOAA Pacific Islands Fisheries Science Center
Native_Data_Set_Environment: Generic Sensor Format multibeam data processed with SAIC SABER processing software on LINUX operating system computers
Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report: Horizontal accuracy is ~20 m as data were collected using GPS with no differential corrections. Vertical accuracy of multibeam data is estimated at 1% of water depth; predicted tidal corrections were applied.
Logical_Consistency_Report: These data are believed to be logically consistent though no tests were performed
Completeness_Report: Varies
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report: Variable
Quantitative_Horizontal_Positional_Accuracy_Assessment:
Horizontal_Positional_Accuracy_Value: 20

Horizontal_Positional_Accuracy_Explanation: Multibeam sonar data. No DGPS corrections applied; 20 m accuracy
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report: Variable
Quantitative_Vertical_Positional_Accuracy_Assessment:
Vertical_Positional_Accuracy_Value: 1
Vertical_Positional_Accuracy_Explanation: Accuracy varies with water depth. observed tides from Guam tide gauge 1630000 were applied. Multibeam data vertical accuracy is ~1% of water depth.
Lineage:
Source_Information:
Source_Citation:
Citation_Information:
Originator: Joyce E. Miller,
Coral Reef Ecosystem Division, NOAA Pacific Islands Fisheries Science Center
Publication_Date: 20060719
Title: Reson 8101ER multibeam bathymetric data
Type_of_Source_Media: Digital data
Source_Time_Period_of_Content:
Time_Period_Information:
Single_Date/Time:
Calendar_Date: 2003
Source_Currentness_Reference: ground condition
Source_Citation_Abbreviation: Reson 8101ER
Source_Contribution: Reson 8101ER (240 kHz) bathymetry and imagery data were collected in depths of ~10-300 m
Process_Step:
Process_Description: Generic Sensor Format multibeam data were processed with SAIC SABER processing software and converted to gridded bathymetry products. See product metadata for detailed processing steps.
Process_Date: 20030826

Distribution_Information:
Distributor:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Joyce E. Miller
Contact_Organization: Coral Reef Ecosystem Division, NOAA Pacific Islands Fisheries Science Center
Contact_Position: Oceanographer

Contact_Address:
Address_Type: mailing and physical address
Address: Kewalo Research Facility, 1125B Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: (808) 956-5239
Contact_Facsimile_Telephone: (808) 983-3730
Contact_Electronic_Mail_Address: Joyce.Miller@noaa.gov
Resource_Description: Reson 8101ER Multibeam Sonar Data from Cruise OES-03-07/ (R/V AHI)
Distribution_Liability: These data are not to be used for navigational purposes. NOAA makes no warranty regarding these data, expressed or implied, nor does the fact of distribution constitute such a warranty. NOAA cannot assume liability for any damages caused by any errors or omissions in these data, nor as a result of the failure of these data to function on a particular system.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: Generic Sensor Format, as described in http://www.ldeo.columbia.edu/res/pi/MB-System/formatdoc/gsf_spec.pdf
Transfer_Size:
Digital_Transfer_Option:
Online_Option: National Geophysical Data Center
Computer_Contact_Information: Multibeam Bathymetry
Network_Address: http://map.ngdc.noaa.gov/website/mgg/multibeam/viewer.htm
Network_Resource_Name:
Fees: None

Metadata_Reference_Information:
Metadata_Date: 20060907
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Coral Reef Ecosystem Division, NOAA Pacific Islands Fisheries Science Center
Contact_Person: Joyce E. Miller
Contact_Address:
Address_Type: Kewalo Research Facility, 1125B Ala Moana Blvd
City: Honolulu

State_or_Province: Hawaii
Postal_Code: 96814
Contact_Voice_Telephone: (808) 956-5239
Contact_Facsimile_Telephone: (808) 983-3730
Contact_Electronic_Mail_Address: Joyce.Miller@noaa.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: Universal Time

Identification_Information:
Citation:
Citation_Information:
Originator: Joyce E. Miller
Publication_Date: 20060907
Title: Reson 8101ER Multibeam Sonar Data from Cruise
OES-03-07/AHI-03-07, Data Set Name Saipan.
Geospatial_Data_Presentation_Form:
Generic Sensor Format (GSF) digital data
Online_Linkage: http://soest.hawaii.edu/pibhmc
Description:
Abstract: Reson 8101ER multibeam Data were collected between
21 August and 13 September 2003 (JD 233-256) aboard NOAA Survey
Launch Acoustic Habitat Investigator (AHI) at Saipan and Tinian Islands and
Tatsumi and Marpi Banks in the Commonwealth of the Northern
Mariana Islands in the Western Pacific during cruise OES-03-07/AHI-03-07.
The AHI was deployed independently from the NOAA Ship Oscar
Elton Sette (OEs).

The multibeam data were logged into data set Saipan
and collected using SAIC ISS-2000 software in the Generic Sensor Format
and processed using SABER editing software. Sound velocity
corrections from a Seabird SBE19 CTD sensor and motion
corrections from a POS-MV vertical reference were applied
to the data in real time. Predicted tides were applied to
the data in real time and observed tides from Guam tide gauge
1630000 with a time corrector of 18 minutes and a tide height
multiplier of 0.94 were applied using SABER postprocessing
software.

Horizontal accuracy is 20m (no differential GPS correctors
applied), vertical accuracy is depth dependent (~1% of
water depth), WGS84 datum. These data are not to be used
for navigation. Depths mapped range from 10 - 300 m.

Purpose: The data were collected in support of Coral Reef
Conservation Program goals to map all shallow (0-30 m)coral
reefs in US Pacific waters and priority moderate (> 30 m)
depth areas by 2009. The data are being used to provide
bathymetric and backscatter data for previously unmapped
areas; in support of ecosystem management requirements for
benthic habitat mapping and location of Essential Fish

Habitat; and to study the geologic features of the area.

Supplemental_Information:
Data were collected aboard the R/V AHI (Acoustic Habitat Investigator), a 8 m (25') survey launch owned and operated by the NOAA Pacific Islands Fisheries Science Center in Honolulu, HI. The R/V AHI's survey sensors include a 240 kHz RESON 8101-ER sonar which measures bathymetry and acoustic backscatter imagery, a TSS/Applanix POS/MV Model 320 which measures time, position, velocity, attitude and heading, and a Seabird SBE 19 CTD used to measure sound velocity profiles.

The AHI's equipment serial numbers, software versions and sensor configuration settings are as follows:

RESON 8101-ER multibeam echosounder
DOC inventory #: CD0000537418
Transducer serial #: 201004
Firmware, dry: 8101-2.07-2D4D
Firmware, wet: 8101-1.06-2F6B

R/V AHI POS/MV Model 320, version 3
DOC inventory #: CD0000476647
PCS serial #: 474
IMU serial #: 203
Controller software: v 1.0.5.0
PCS Firmware: 2.16

Seabird SBE19 CTD:
Serial #: 3029

R/V AHI Lever Arm Distances and Alignment Offsets
The R/V AHI Reference Point (RP) is defined to be the intersection of the vessel's centerline, the cabin deck and the bulkhead immediately aft of the transducer. This is marked by a punch in the deck weld at that location. Positive X means the point is forward of the RP, positive Y means the point is to starboard of the RP, positive Z means the point is below the RP. The loaded waterline is defined as the intersection of the vessel's performance wing with the hull at the transom.

Antenna Baseline Distance, m: 1.229
Transducer depth below waterline, m 0.62

RP to IMU 0.80 0.00 0.08
RP to Primary GPS Antenna -3.55 -0.61 -1.88
RP to Vessel 0.16 0.00 0.77
RP to Sensor 1(MB transducer) 0.16 0.00 0.77
RP to Sensor 2 0 0 0
RP to Aux. GPS Antenna 0 0 0
RP to Heave lever arm(deg) -0.67 0.00 0.00
IMU rotation Ref. Frame, deg 0 0 0
Sensor 1 rotation Ref. Frame, deg 0 0 0
Sensor 2 rotation Ref. Frame, deg 0 0 0

Roll offset: +0.5 deg
Pitch offset: 0.0 deg
Gyro offset: 0.0 deg

Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 20030821
Ending_Date: 20030913
Currentness_Reference: ground condition
Status:
Progress: In Work
Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: 145.57453
East_Bounding_Coordinate: 145.891634
North_Bounding_Coordinate: 15.450298
South_Bounding_Coordinate: 14.888161
Keywords:
Theme:
Theme_Keyword_Thesaurus: CoRIS Theme Thesaurus Version 1.0
Theme_Keyword: EARTH SCIENCE > Oceans > Bathymetry/Seafloor Topography > Bathymetry
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Bathymetry
Theme_Keyword: Multibeam sonar
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Saipan Island
Place_Keyword: Tinian Island

Place_Keyword: Marpi Bank
Place_Keyword: Tinian
Place_Keyword: Garapan Anchorage
Place_Keyword: Commonwealth of the Northern Mariana Islands
Place_Keyword: Islands
Place:
Place_Keyword_Thesaurus: CoRIS Place Thesaurus Version 1.0
Place_Keyword: OCEAN BASIN > Pacific Ocean > Western Pacific Ocean > Commonwealth of the Northern Mariana Islands > Saipan, Tinian, Marpi, Tatsumi > Islands
Place_Keyword: COUNTRY/COMMONWEALTH > United States of America > Hawaii > Honolulu
Access_Constraints: None.
Use_Constraints: These data are NOT TO BE USED FOR NAVIGATION
Point_of_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Joyce E. Miller
Contact_Organization: Coral Reef Ecosystem Division,
Pacific Islands Fisheries Science Center
Contact_Position: Oceanographer
Contact_Address:
Address_Type: mailing and physical address
Address: Kewalo Research Facility, 1125B Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: (808) 956-5239
Contact_Facsimile_Telephone: (808) 983-3730
Contact_Electronic_Mail_Address: Joyce.Miller@noaa.gov
Data_Set_Credit: Joyce E. Miller Coral Reef Ecosystem Division,
NOAA Pacific Islands Fisheries Science Center
Native_Data_Set_Environment: Generic Sensor Format multibeam
data processed with SAIC SABER processing software on LINUX
operating system computers
Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report: Horizontal accuracy is ~20 m as
data were collected using GPS with no differential
corrections. Vertical accuracy of multibeam data is
estimated at 1% of water depth; predicted tidal corrections
were applied.
Logical_Consistency_Report: These data are believed to be

logically consistent though no tests were performed
Completeness_Report: Varies
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report: Variable
Quantitative_Horizontal_Positional_Accuracy_Assessment:
Horizontal_Positional_Accuracy_Value: 20
Horizontal_Positional_Accuracy_Explanation: Multibeam sonar data. No DGPS corrections applied; 20 m accuracy
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report: Variable
Quantitative_Vertical_Positional_Accuracy_Assessment:
Vertical_Positional_Accuracy_Value: 1
Vertical_Positional_Accuracy_Explanation: Accuracy varies with water depth. Predicted tide correctors applied; multibeam data vertical accuracy is ~1% of water depth.
Lineage:
Source_Information:
Source_Citation:
Citation_Information:
Originator: Joyce E. Miller,
Coral Reef Ecosystem Division, NOAA Pacific Islands Fisheries Science Center
Publication_Date: 20060907
Title: Reson 8101ER multibeam bathymetric data
Type_of_Source_Media: Digital data
Source_Time_Period_of_Content:
Time_Period_Information:
Single_Date/Time:
Calendar_Date: 2003
Source_Currentness_Reference: ground condition
Source_Citation_Abbreviation: Reson 8101ER
Source_Contribution: Reson 8101ER (240 kHz) bathymetry and imagery data were collected in depths of ~10-300 m.
Process_Step:
Process_Description: Generic Sensor Format multibeam data were processed with SAIC SABER processing software and converted to gridded bathymetry products. See product metadata for detailed processing steps.
Process_Date: 20030813

Distribution_Information:
Distributor:

Contact_Information:
Contact_Person_Primary:
Contact_Person: Joyce E. Miller
Contact_Organization: Coral Reef Ecosystem Division,
NOAA Pacific Islands Fisheries Science Center
Contact_Position: Oceanographer
Contact_Address:
Address_Type: mailing and physical address
Address: Kewalo Research Facility, 1125B Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: (808) 956-5239
Contact_Facsimile_Telephone: (808) 983-3730
Contact_Electronic_Mail_Address: Joyce.Miller@noaa.gov
Resource_Description: Reson 8101ER Multibeam Sonar Data from
Cruise OES-03-07/AHI-03-07. Data Set Name: Saipan.
Distribution_Liability: These data are not to be used for
navigational purposes. NOAA makes no warranty regarding these
data, expressed or implied, nor does the fact of distribution
constitute such a warranty. NOAA cannot assume liability for
any damages caused by any errors or omissions in these data,
nor as a result of the failure of these data to function on a
particular system.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: Generic Sensor Format, as described in
http://www.ldeo.columbia.edu/res/pi/MB-System/formatdoc/gsf_spec.pdf
Transfer_Size:
Digital_Transfer_Option:
Online_Option: National Geophysical Data Center
Computer_Contact_Information: Multibeam Bathymetry
Network_Address: http://map.ngdc.noaa.gov/website/mgg/multibeam/viewer.htm
Network_Resource_Name:
Fees: None

Metadata_Reference_Information:
Metadata_Date: 20060907
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:

Contact_Organization: Coral Reef Ecosystem Division,
NOAA Pacific Islands Fisheries Science Center
Contact_Person: Joyce E. Miller
Contact_Address:
Address_Type: Kewalo Research Facility, 1125B Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Contact_Voice_Telephone: (808) 956-5239
Contact_Facsimile_Telephone: (808) 938-3730
Contact_Electronic_Mail_Address: Joyce.Miller@noaa.gov
Metadata_Standard_Name: FGDC Content Standards for Digital
Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: Universal Time

Identification_Information:
Citation:
Citation_Information:
Originator: Joyce E. Miller
Publication_Date: 20060907
Title: Reson 8101ER Multibeam Sonar Data from Cruise
OES-03-07/AHI-03-07, Data Set Name Rota.
Geospatial_Data_Presentation_Form:
Generic Sensor Format (GSF) digital data
Online_Linkage: http://soest.hawaii.edu/pibhmc
Description:
Abstract: Reson 8101ER multibeam Data were collected between 16-17 September 2003 (JD 259-260) aboard NOAA Survey Launch Acoustic Habitat Investigator (AHI) at Rota Island in the Commonwealth of the Northern Mariana Islands in the Western Pacific during cruise OES-03-07/AHI-03-07. The AHI was deployed independently from the NOAA Ship Oscar Elton Sette (OES) during the cruise.

The multibeam data were logged into data set Rota and collected using SAIC ISS-2000 software in the Generic Sensor Format and processed using SABER editing software. Sound velocity corrections from a Seabird SBE19 CTD sensor and motion corrections from a POS-MV vertical reference were applied to the data in real time. Observed tides from Guam tide gauge 1630000 were applied using SABER postprocessing software.

Horizontal accuracy is 20m (no differential GPS correctors applied), vertical accuracy is depth dependent (~1% of water depth), WGS84 datum. These data are not to be used for navigation. Depths mapped range from ~ 10 - 300 m.

Purpose: The data were collected in support of Coral Reef Conservation Program goals to map all shallow (0-30 m)coral reefs in US Pacific waters and priority moderate (> 30 m) depth areas by 2009. The data are being used to provide bathymetric and backscatter data for previously unmapped areas; in support of ecosystem management requirements for benthic habitat mapping and location of Essential Fish Habitat; and to study the geologic features of the area.

Supplemental_Information:
Data were collected aboard the R/V AHI (Acoustic Habitat Investigator), a 8 m (25') survey launch owned and operated by the NOAA Pacific Islands Fisheries Science Center in Honolulu, HI. The R/V AHI's survey sensors include a 240 kHz RESON 8101-ER sonar which measures bathymetry and acoustic backscatter imagery, a TSS/Applanix POS/MV Model 320 which measures time, position, velocity, attitude and heading, and a Seabird SBE 19 CTD used to measure sound velocity profiles.

The AHI's equipment serial numbers, software versions and sensor configuration settings are as follows:

RESON 8101-ER multibeam echosounder
DOC inventory #: CD0000537418
Transducer serial #: 201004
Firmware, dry: 8101-2.07-2D4D
Firmware, wet: 8101-1.06-2F6B

R/V AHI POS/MV Model 320, version 3
DOC inventory #: CD0000476647
PCS serial #: 474
IMU serial #: 203
Controller software: v 1.0.5.0
PCS Firmware: 2.16

Seabird SBE19 CTD:
Serial #: 3029

R/V AHI Lever Arm Distances and Alignment Offsets
The R/V AHI Reference Point (RP) is defined to be the intersection of the vessel's centerline, the cabin deck and the bulkhead immediately aft of the transducer. This is marked by a punch in the deck weld at that location. Positive X means the point is forward of the RP, positive Y means the point is to starboard of the RP, positive Z means the point is below the RP. The loaded waterline is defined as the intersection of the vessel's performance wing with the hull at the transom.

Antenna Baseline Distance, m: 1.229
Transducer depth below waterline, m 0.62

RP to IMU 0.80 0.00 0.08

RP to Primary GPS Antenna -3.55 -0.61 -1.88
RP to Vessel 0.16 0.00 0.77
RP to Sensor 1(MB transducer) 0.16 0.00 0.77
RP to Sensor 2 0 0 0
RP to Aux. GPS Antenna 0 0 0
RP to Heave lever arm(deg) -0.67 0.00 0.00
IMU rotation Ref. Frame, deg 0 0 0
Sensor 1 rotation Ref. Frame, deg 0 0 0
Sensor 2 rotation Ref. Frame, deg 0 0 0

Roll offset: +0.5 deg
Pitch offset: 0.0 deg
Gyro offset: 0.0 deg

Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 20030916
Ending_Date: 20030917
Currentness_Reference: ground condition
Status:
Progress: In Work
Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: 145.115762
East_Bounding_Coordinate: 145.171183
North_Bounding_Coordinate: 14.153463
South_Bounding_Coordinate: 14.101753
Keywords:
Theme:
Theme_Keyword_Thesaurus: CoRIS Theme Thesaurus Version 1.0
Theme_Keyword: EARTH SCIENCE > Oceans > Bathymetry/Seafloor Topography > Bathymetry
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Bathymetry
Theme_Keyword: Multibeam sonar
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Rota Island
Place_Keyword: Commonwealth of the Northern Mariana Islands
Place_Keyword: Islands
Place:

Place_Keyword_Thesaurus: CoRIS Place Thesaurus Version 1.0
Place_Keyword: OCEAN BASIN > Pacific Ocean > Western Pacific Ocean > Commonwealth of the Northern Mariana Islands > Rota > Islands
Place_Keyword: COUNTRY/COMMONWEALTH > United States of America > Hawaii > Honolulu
Access_Constraints: None.
Use_Constraints: These data are NOT TO BE USED FOR NAVIGATION
Point_of_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Joyce E. Miller
Contact_Organization: Coral Reef Ecosystem Division,
Pacific Islands Fisheries Science Center
Contact_Position: Oceanographer
Contact_Address:
Address_Type: mailing and physical address
Address: Kewalo Research Facility, 1125B Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: (808) 956-5239
Contact_Facsimile_Telephone: (808) 983-3730
Contact_Electronic_Mail_Address: Joyce.Miller@noaa.gov
Data_Set_Credit: Joyce E. Miller Coral Reef Ecosystem Division,
NOAA Pacific Islands Fisheries Science Center
Native_Data_Set_Environment: Generic Sensor Format multibeam
data processed with SAIC SABER processing software on LINUX
operating system computers

Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report: Horizontal accuracy is ~20 m as
data were collected using GPS with no differential
corrections. Vertical accuracy of multibeam data is
estimated at 1% of water depth; predicted tidal corrections
were applied.
Logical_Consistency_Report: These data are believed to be
logically consistent though no tests were performed
Completeness_Report: Varies
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report: Variable

Quantitative_Horizontal_Positional_Accuracy_Assessment:
Horizontal_Positional_Accuracy_Value: 20
Horizontal_Positional_Accuracy_Explanation: Multibeam sonar data. No DGPS corrections applied; 20 m accuracy
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report: Variable
Quantitative_Vertical_Positional_Accuracy_Assessment:
Vertical_Positional_Accuracy_Value: 1
Vertical_Positional_Accuracy_Explanation: Accuracy varies with water depth. Observed tide correctors from Guam tide gauge 1630000 applied; multibeam data vertical accuracy is ~1% of water depth.
Lineage:
Source_Information:
Source_Citation:
Citation_Information:
Originator: Joyce E. Miller,
Coral Reef Ecosystem Division, NOAA Pacific Islands Fisheries Science Center
Publication_Date: 20060907
Title: Reson 8101ER multibeam bathymetric data
Type_of_Source_Media: Digital data
Source_Time_Period_of_Content:
Time_Period_Information:
Single_Date/Time:
Calendar_Date: 2003
Source_Currentness_Reference: ground condition
Source_Citation_Abbreviation: Reson 8101ER
Source_Contribution: Reson 8101ER (240 kHz) bathymetry and imagery data were collected in depths of ~10-300 m.
Process_Step:
Process_Description: Generic Sensor Format multibeam data were processed with SAIC SABER processing software and converted to gridded bathymetry products. See product metadata for detailed processing steps.
Process_Date: 20030817

Distribution_Information:
Distributor:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Joyce E. Miller
Contact_Organization: Coral Reef Ecosystem Division,

NOAA Pacific Islands Fisheries Science Center
Contact_Position: Oceanographer
Contact_Address:
Address_Type: mailing and physical address
Address: Kewalo Research Facility, 1125B Ala Moana Blvd
City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Country: USA
Contact_Voice_Telephone: (808) 956-5239
Contact_Facsimile_Telephone: (808) 983-3730
Contact_Electronic_Mail_Address: Joyce.Miller@noaa.gov
Resource_Description: Reson 8101ER Multibeam Sonar Data from Cruise OES-03-07/AHI-03-07. Data Set Name: Rota.
Distribution_Liability: These data are not to be used for navigational purposes. NOAA makes no warranty regarding these data, expressed or implied, nor does the fact of distribution constitute such a warranty. NOAA cannot assume liability for any damages caused by any errors or omissions in these data, nor as a result of the failure of these data to function on a particular system.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: Generic Sensor Format, as described in http://www.ldeo.columbia.edu/res/pi/MB-System/formatdoc/gsf_spec.pdf
Transfer_Size:
Digital_Transfer_Option:
Online_Option: National Geophysical Data Center
Computer_Contact_Information: Multibeam Bathymetry
Network_Address: http://map.ngdc.noaa.gov/website/mgg/multibeam/viewer.htm
Network_Resource_Name:
Fees: None
Metadata_Reference_Information:
Metadata_Date: 20060907
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Coral Reef Ecosystem Division, NOAA Pacific Islands Fisheries Science Center
Contact_Person: Joyce E. Miller
Contact_Address:
Address_Type: Kewalo Research Facility, 1125B Ala Moana Blvd

City: Honolulu
State_or_Province: Hawaii
Postal_Code: 96814
Contact_Voice_Telephone: (808) 956-5239
Contact_Facsimile_Telephone: (808) 983-3730
Contact_Electronic_Mail_Address: Joyce.Miller@noaa.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: Universal Time