

The Bathymetry of the Central
Mediterranean Sea in the framework of
the EMODnet project
a case study of bathymetric data
integration and processing.

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CNR-ISMAR – Institute of Marine Science

GEBCO Science Day 2011 – La Jolla 4th October 2011.

OUTLINE

- Introduction – Overview of CNR-ISMAR Database
 - Bathymetric data collection and processing
- The Bathymetry of the Adriatic sea – single beam and multi beam data integration case study
 - ISMAR in EMODnet - DTM production and GEBCO data integration
 - EMODnet products in the Central Mediterranean sea
 - WHY BATHYMETRY? - some examples of application in Oceanography, Geology and Geohazard assessment, habitat mapping
- Conclusions

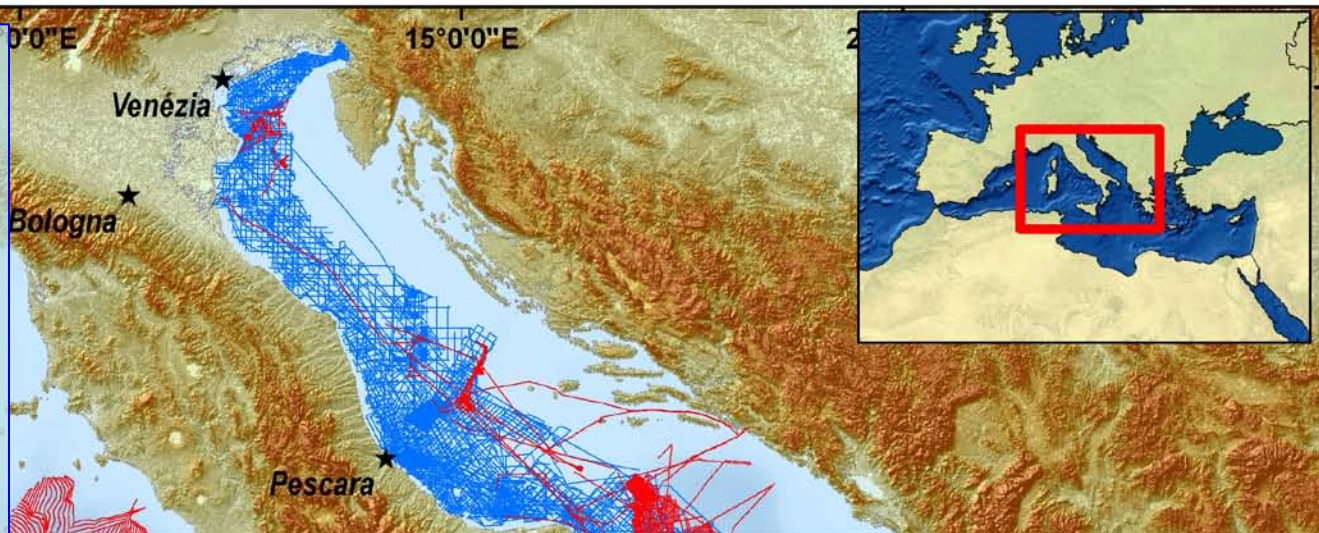


ISMAR

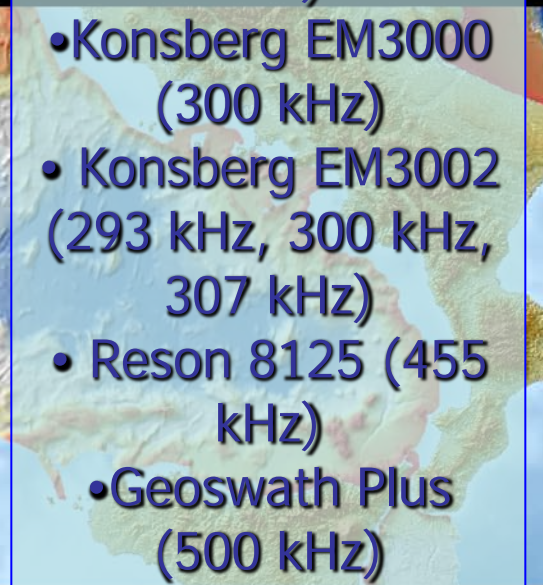
Istituto di Scienze Marine

CNR-ISMAR Database

From 1991 to 2011
ISMAR collected
about **113.500** km
of seismic profile
and bathymetric
data on board R/V
STRAKHOV
URANIA



CNR-ISMAR Database

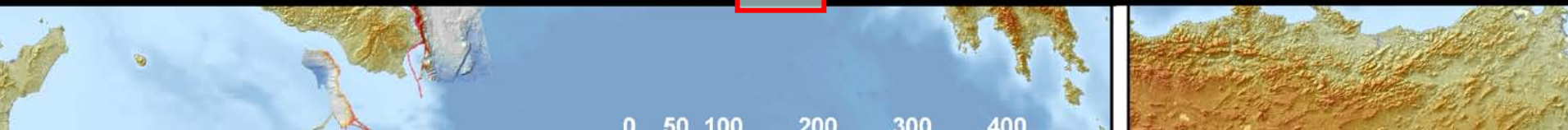
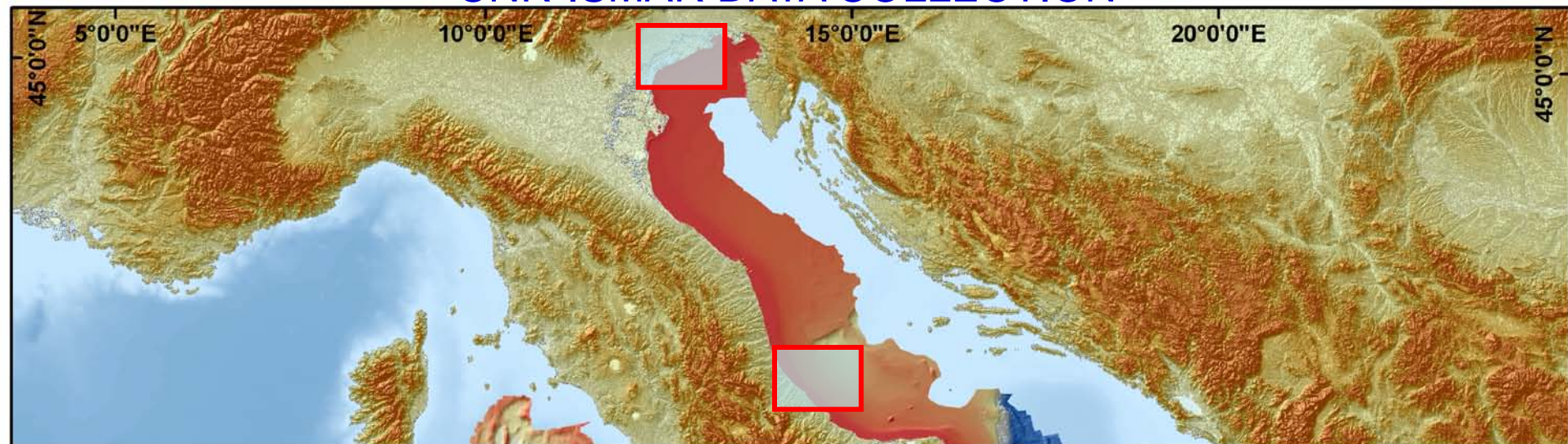


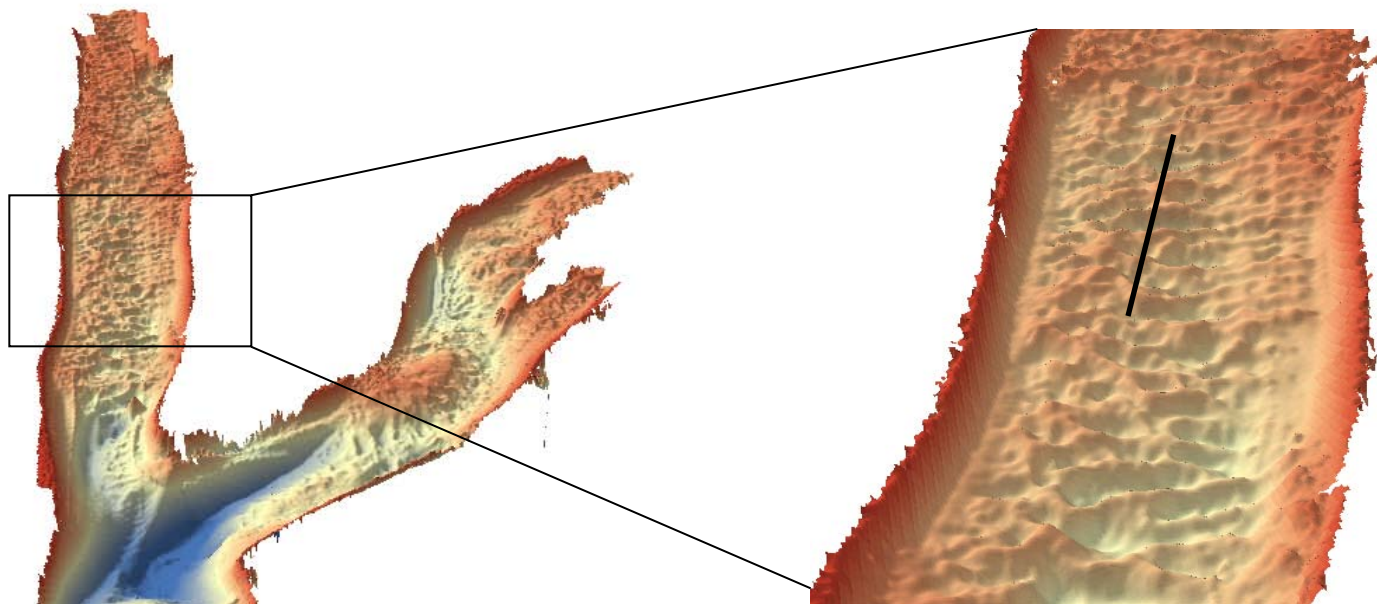
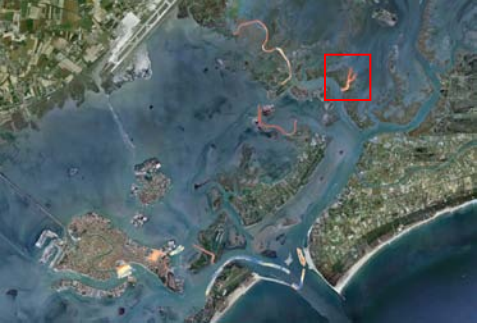


•MAGIC Project

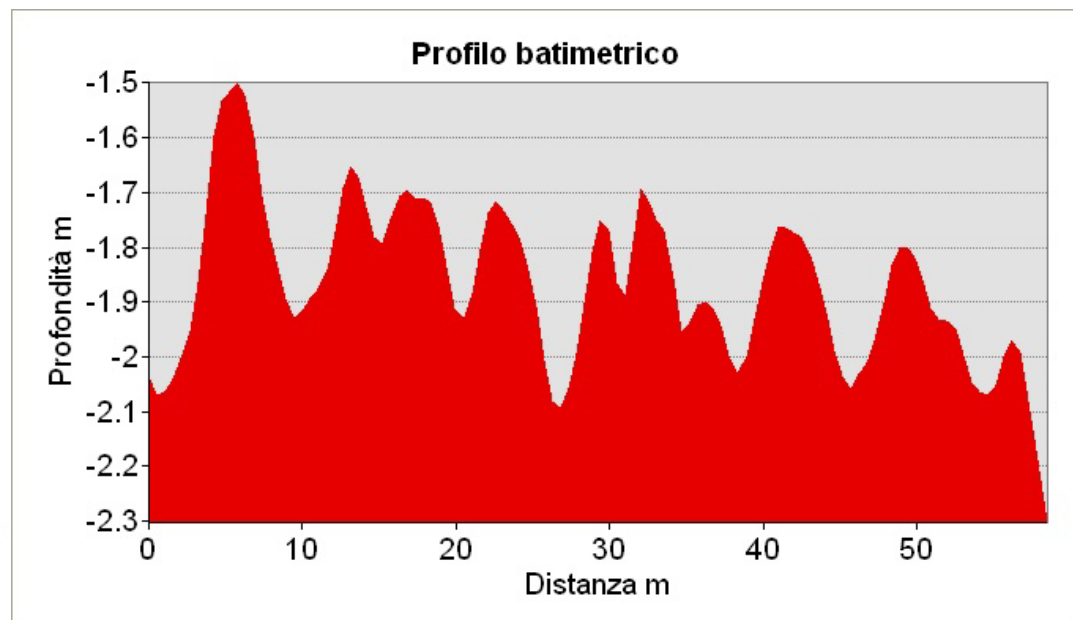
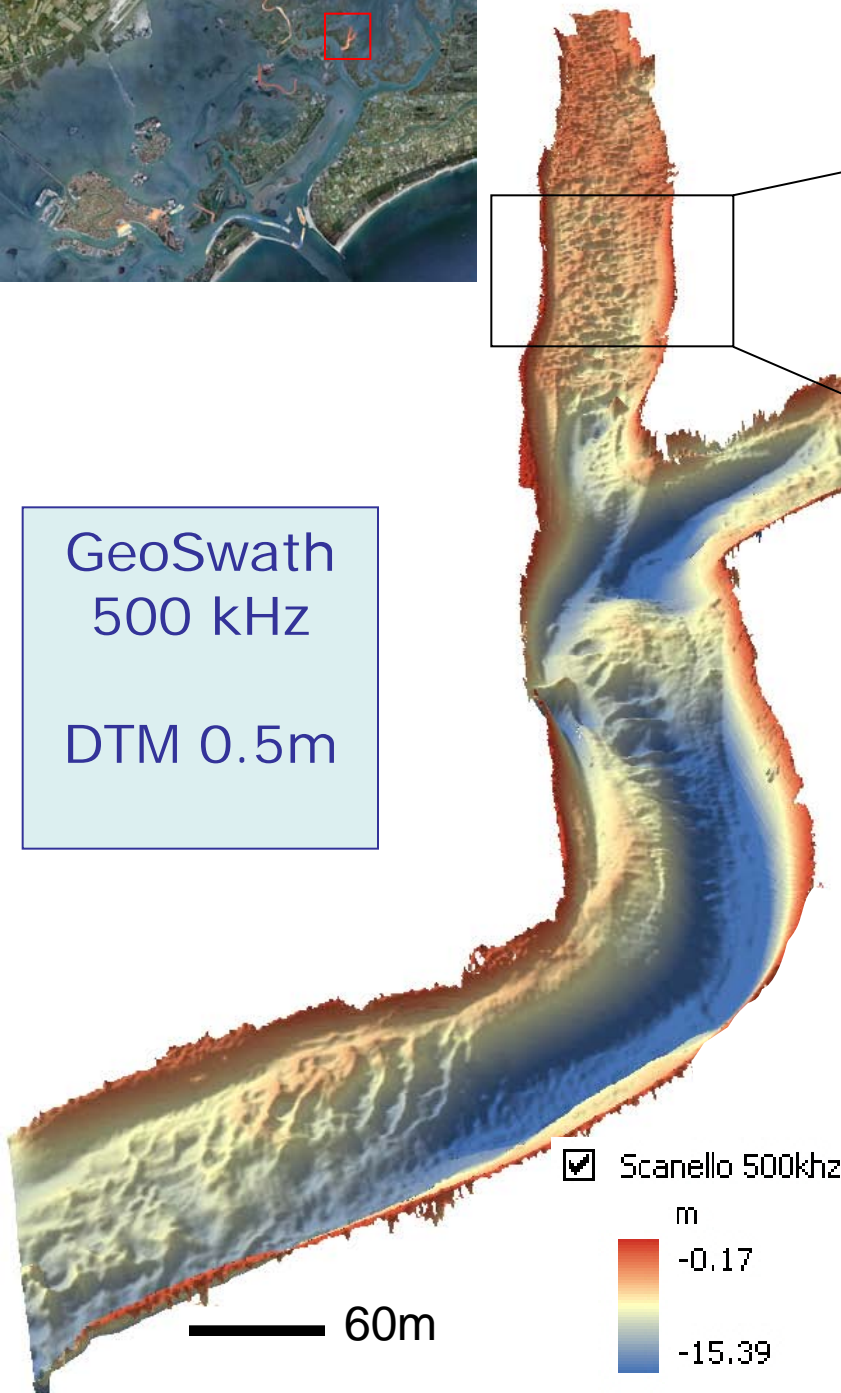
An integrated research project for acquiring high-resolution morphobathymetry and producing geohazard maps of the continental margins of Italy

CNR-ISMAR DATA COLLECTION

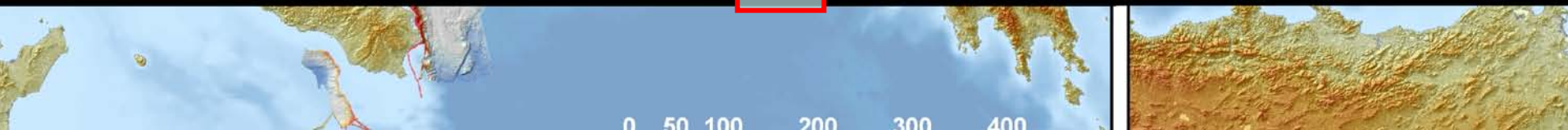
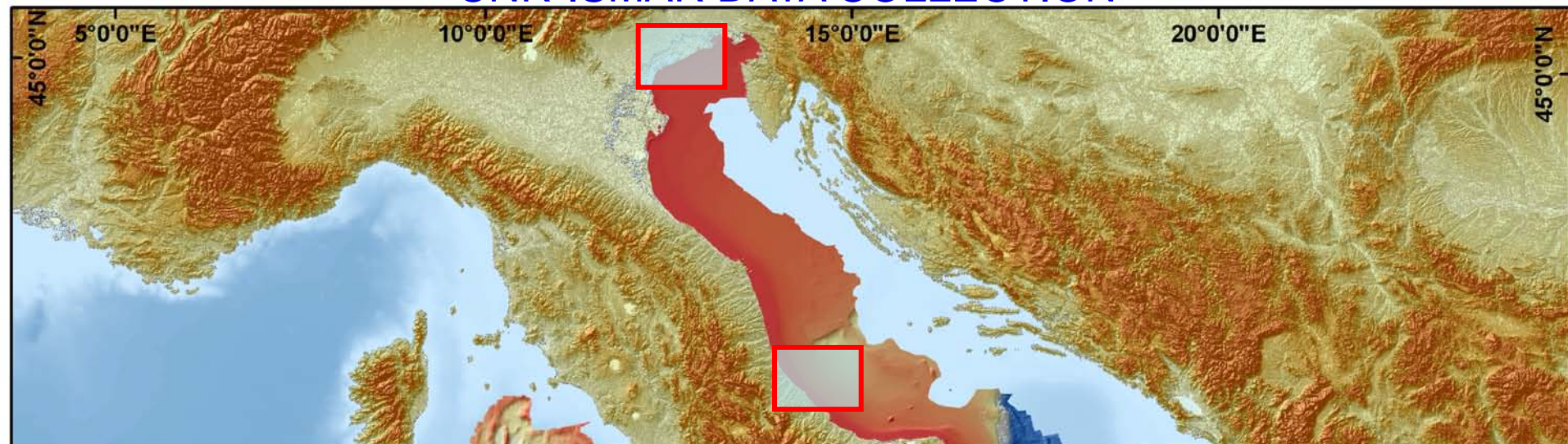


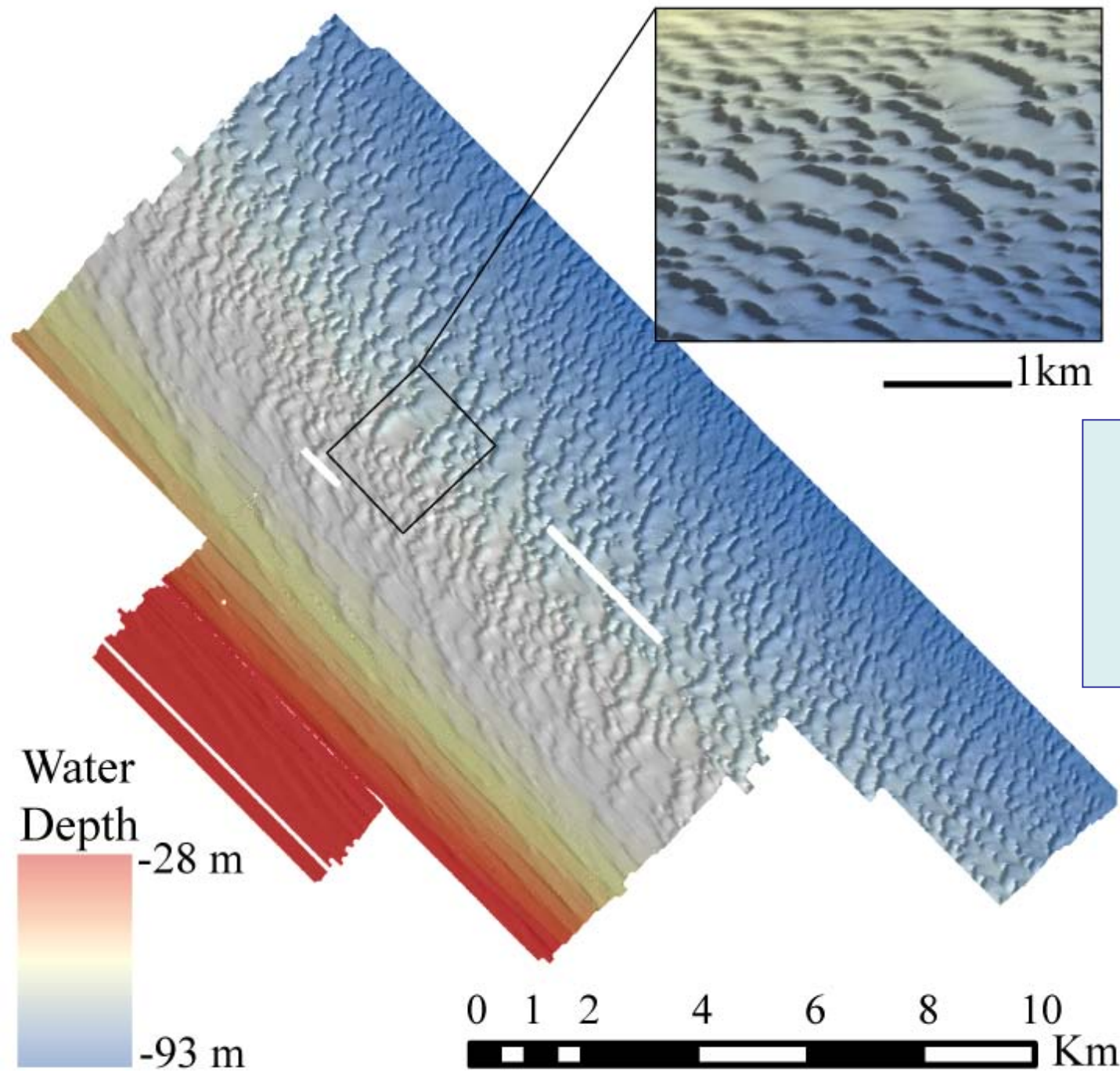


GeoSwath
500 kHz
DTM 0.5m



CNR-ISMAR DATA COLLECTION



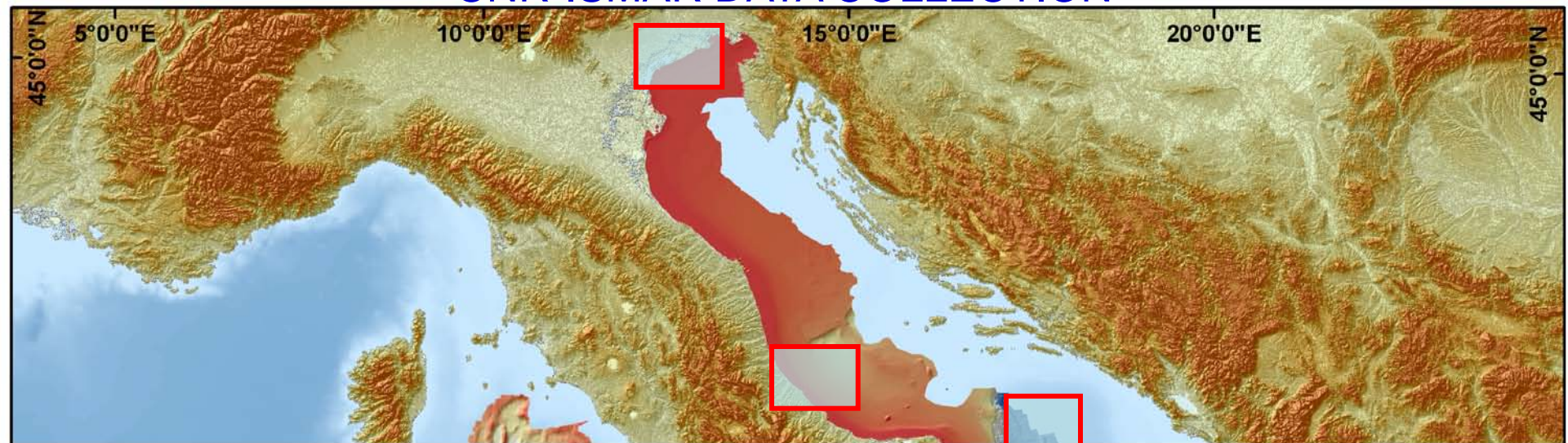


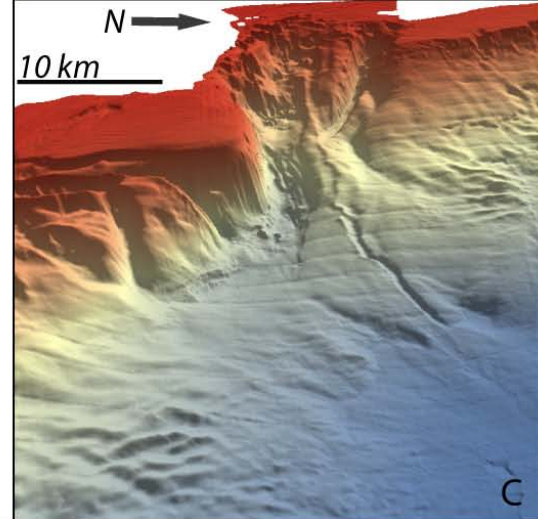
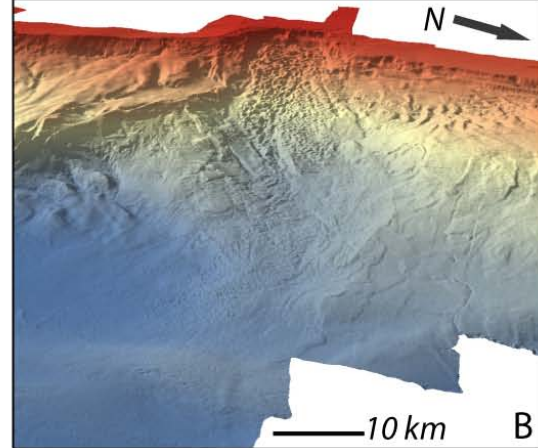
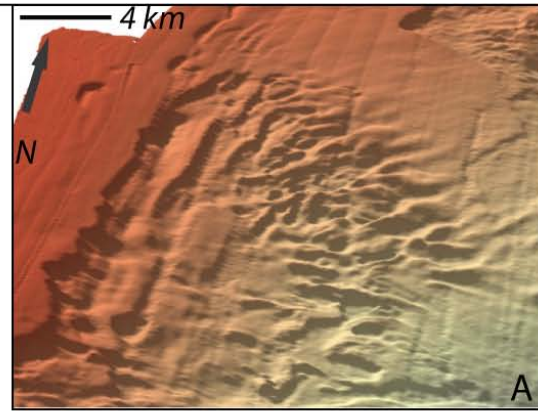
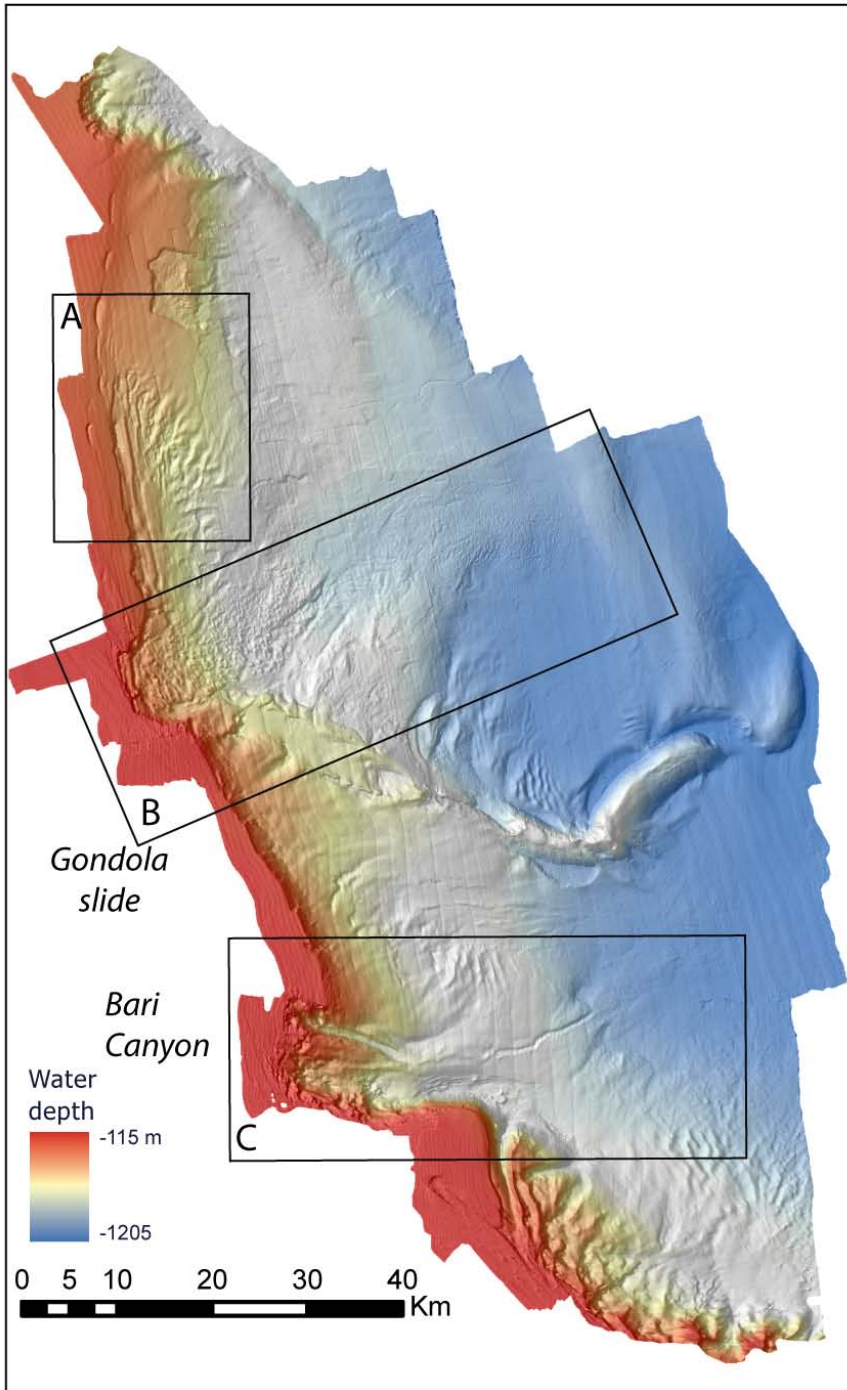
DTM
RESOLUTION
5M
EM3000

Water
Depth
-28 m
-93 m

0 1 2 4 6 8 10 Km

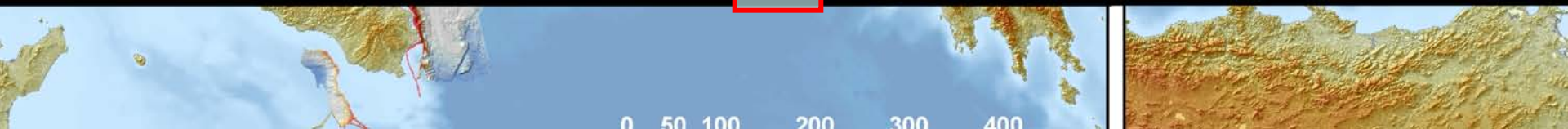
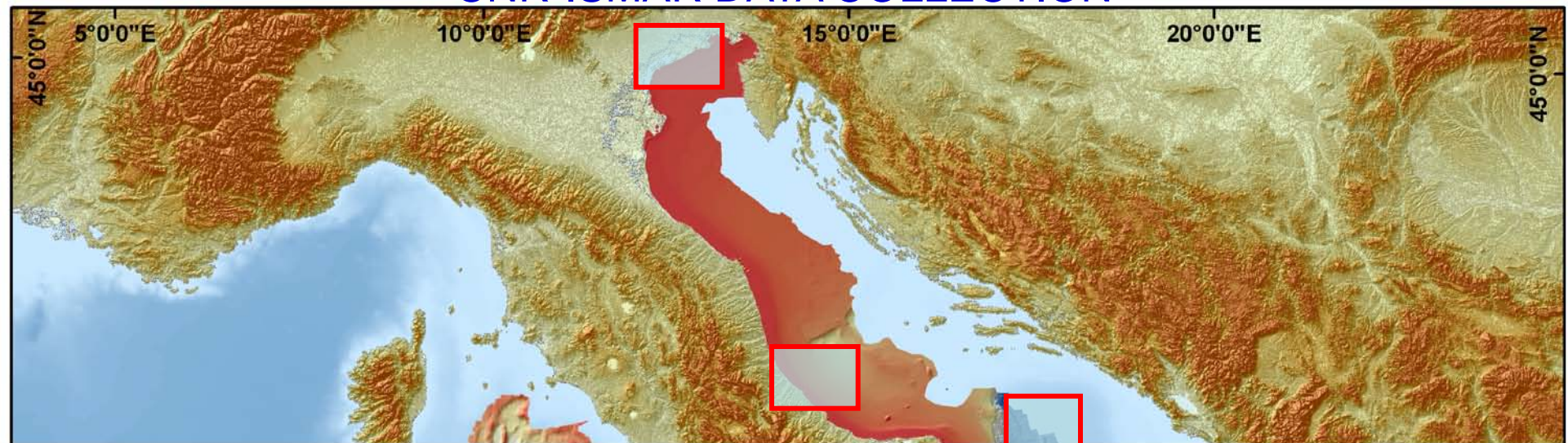
CNR-ISMAR DATA COLLECTION



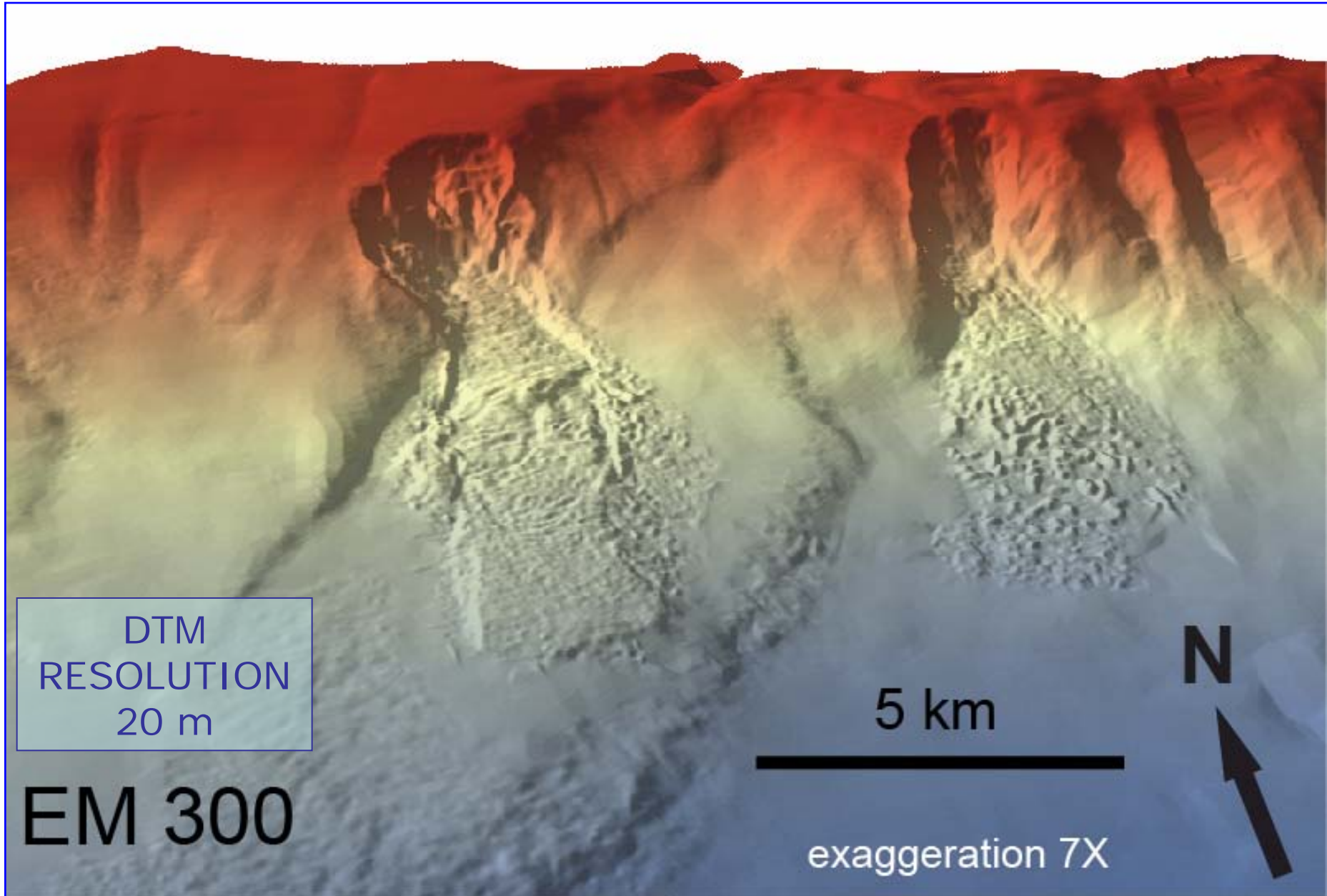


DTM
RESOLUTION
20 m
RESON 8160

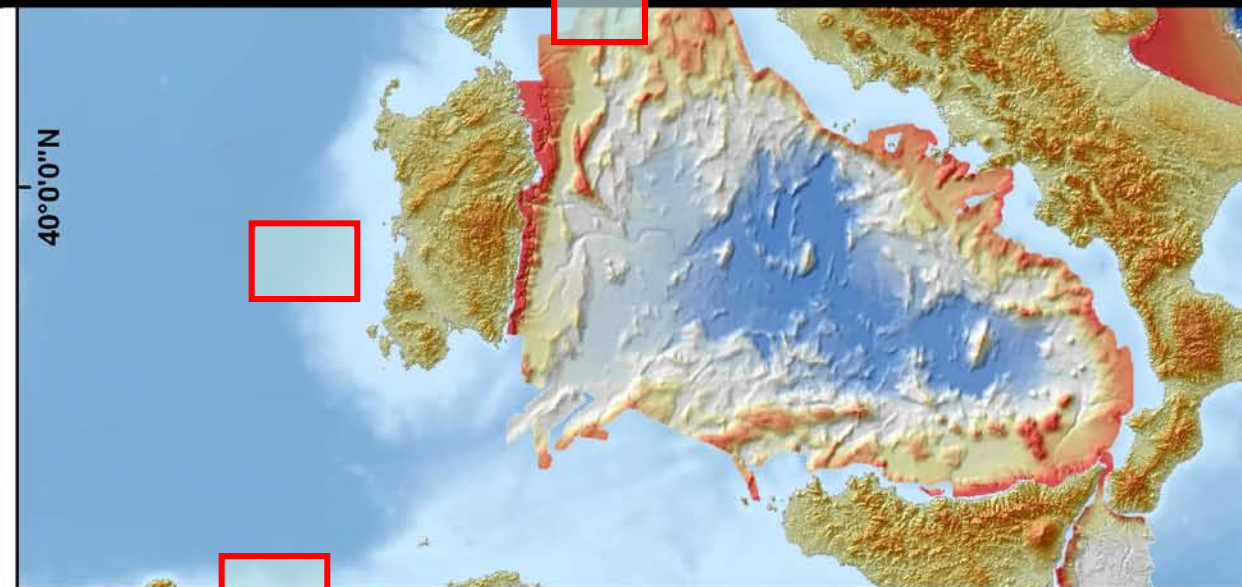
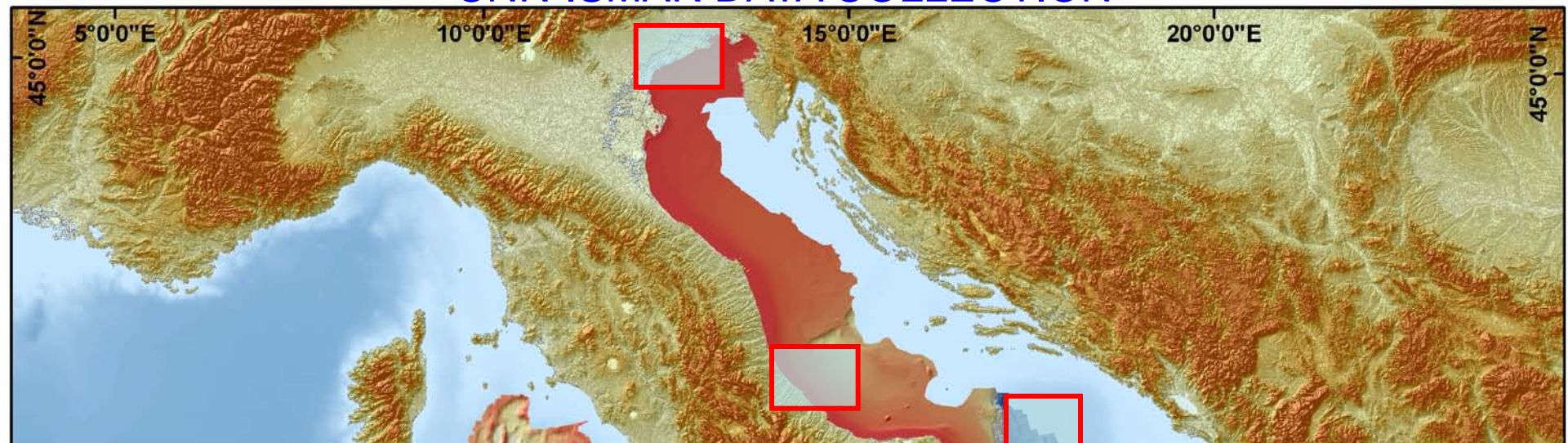
CNR-ISMAR DATA COLLECTION

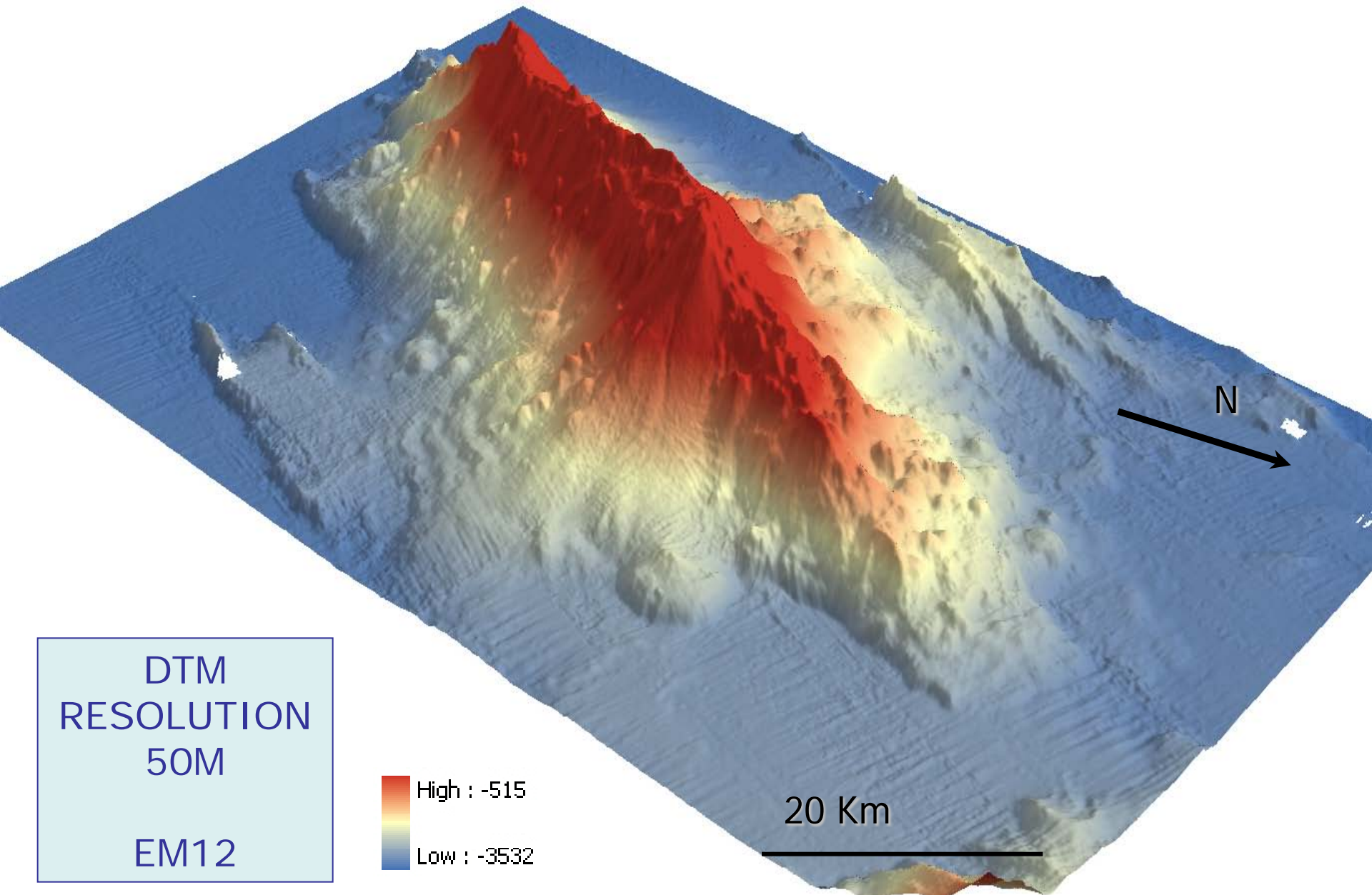


TWIN SLIDES



CNR-ISMAR DATA COLLECTION



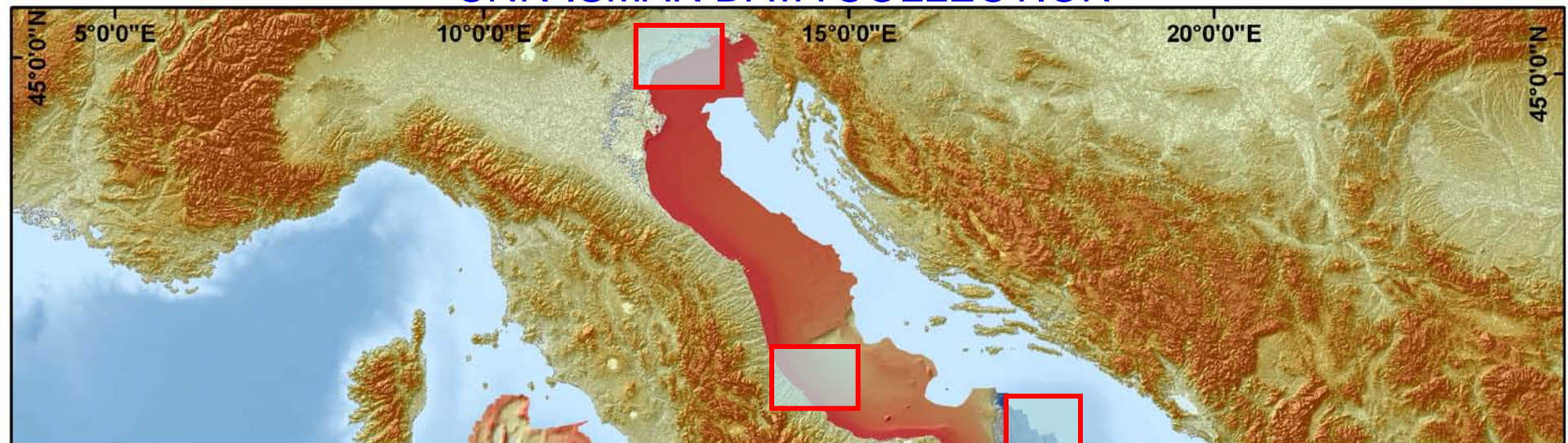


DTM
RESOLUTION
50M
EM12

High : -515
Low : -3532

20 Km

CNR-ISMAR DATA COLLECTION



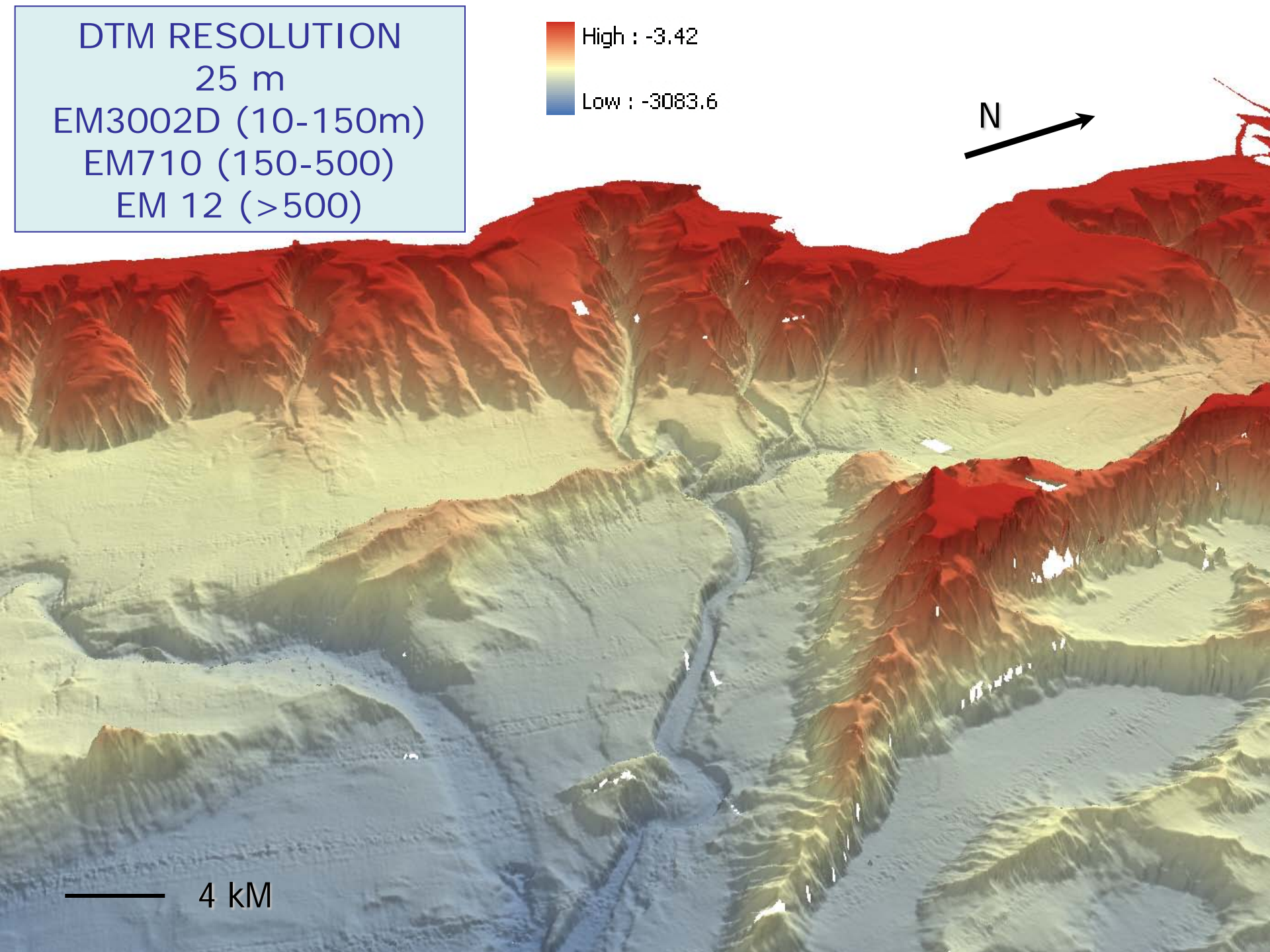
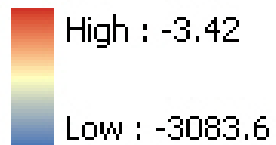
DTM RESOLUTION

25 m

EM3002D (10-150m)

EM710 (150-500)

EM 12 (>500)

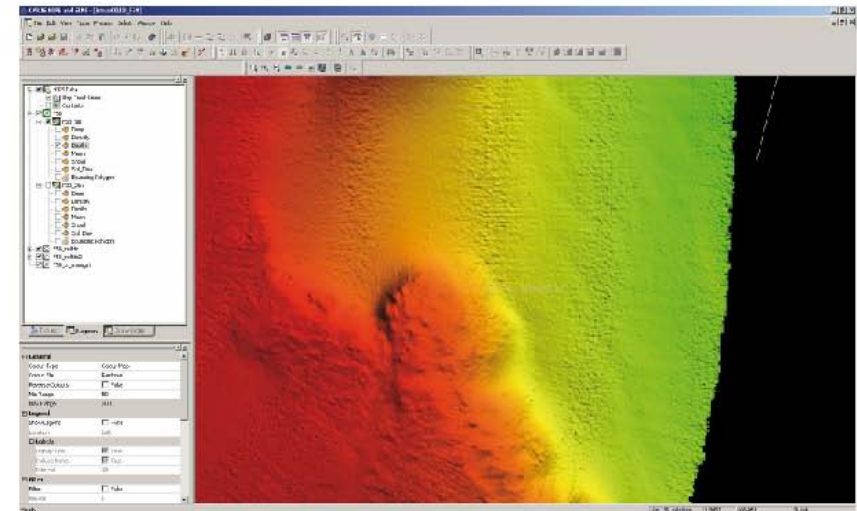
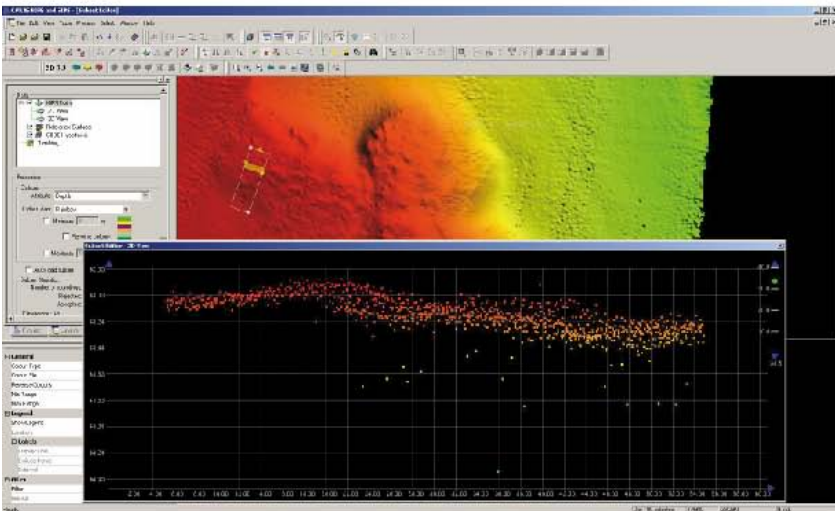
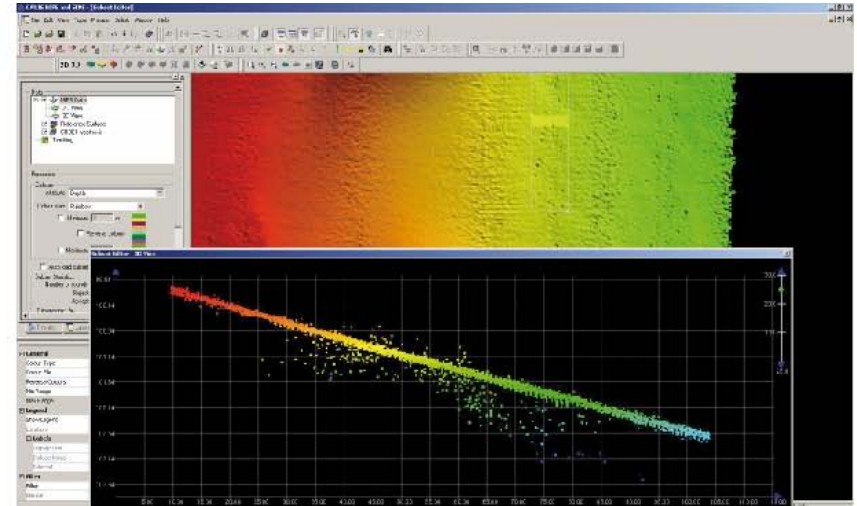
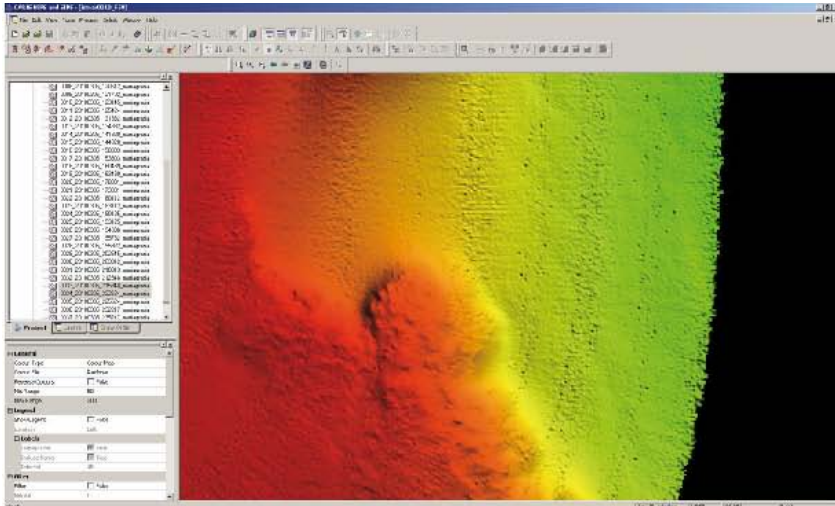


4 km

DATA PROCESSING – Features Detection

DATA ANALYSIS AND
ERROR DETECTION

DATA INTERPRETATION AND
ACCURATE MANUAL
CLEANING



ADRIATIC SEA - SB and MB DATA INTEGRATION

Single Beam echo soundings

SB interpretation and processing

Variable density XYZ soundings

Multi Beam swath bathymetry

Multi beam Data Processing for single surveys

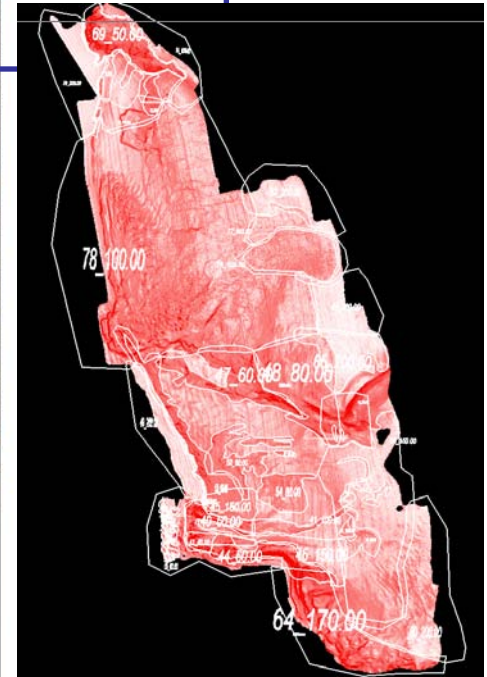
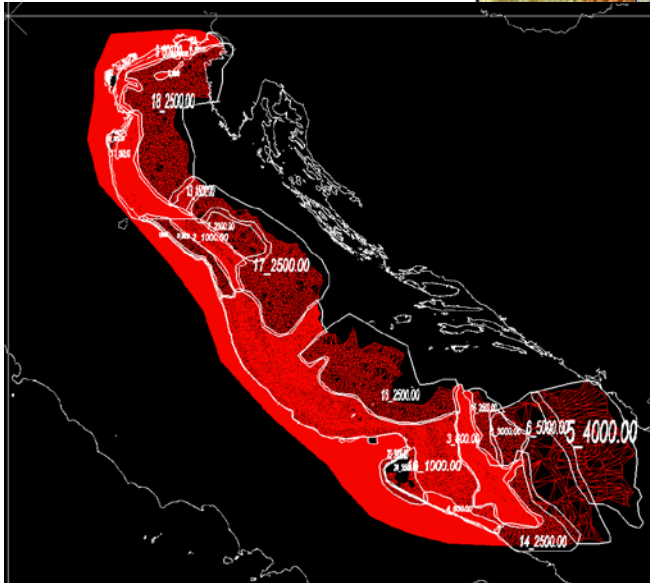
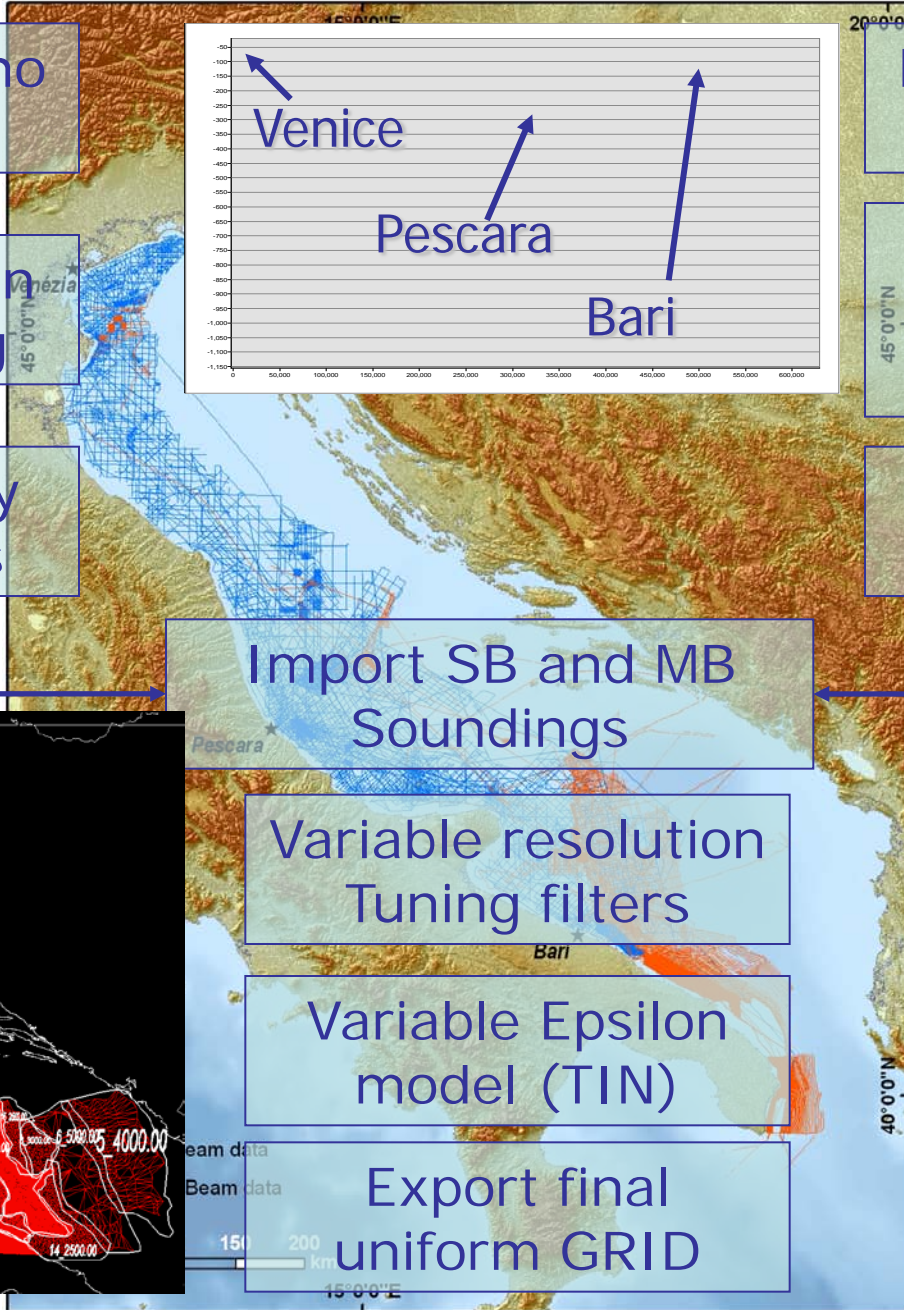
High density xyz soundings

Import SB and MB Soundings

Variable resolution Tuning filters

Variable Epsilon model (TIN)

Export final uniform GRID

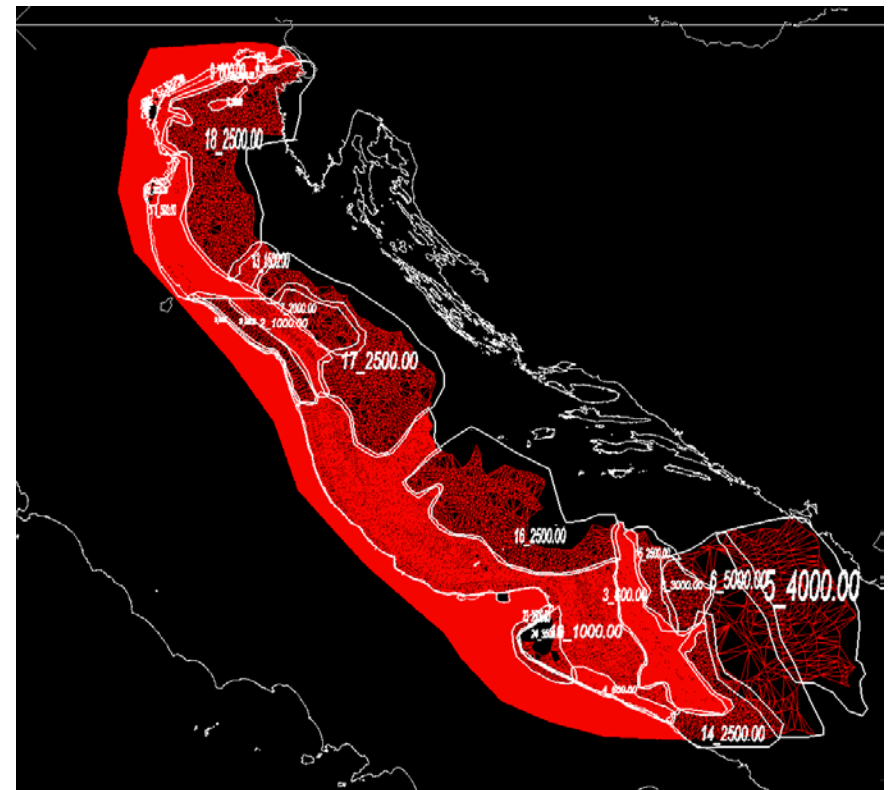




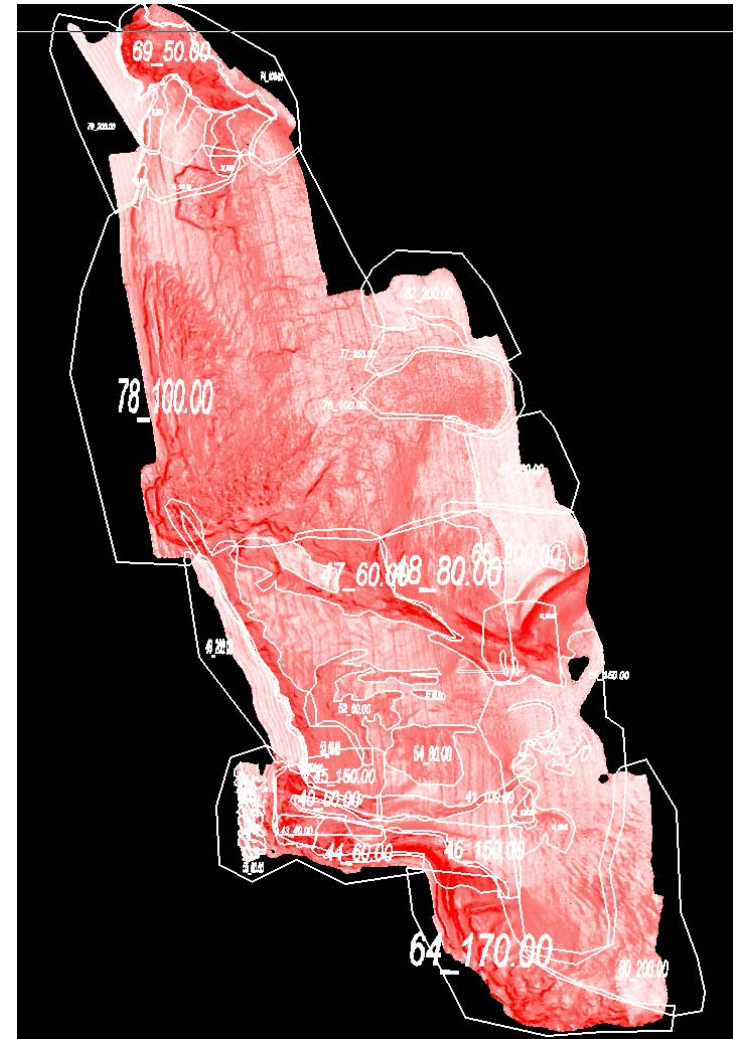
THE ADRIATIC SEA - SB and MB DATA INTEGRATION

Variable resolution
Tuning filters

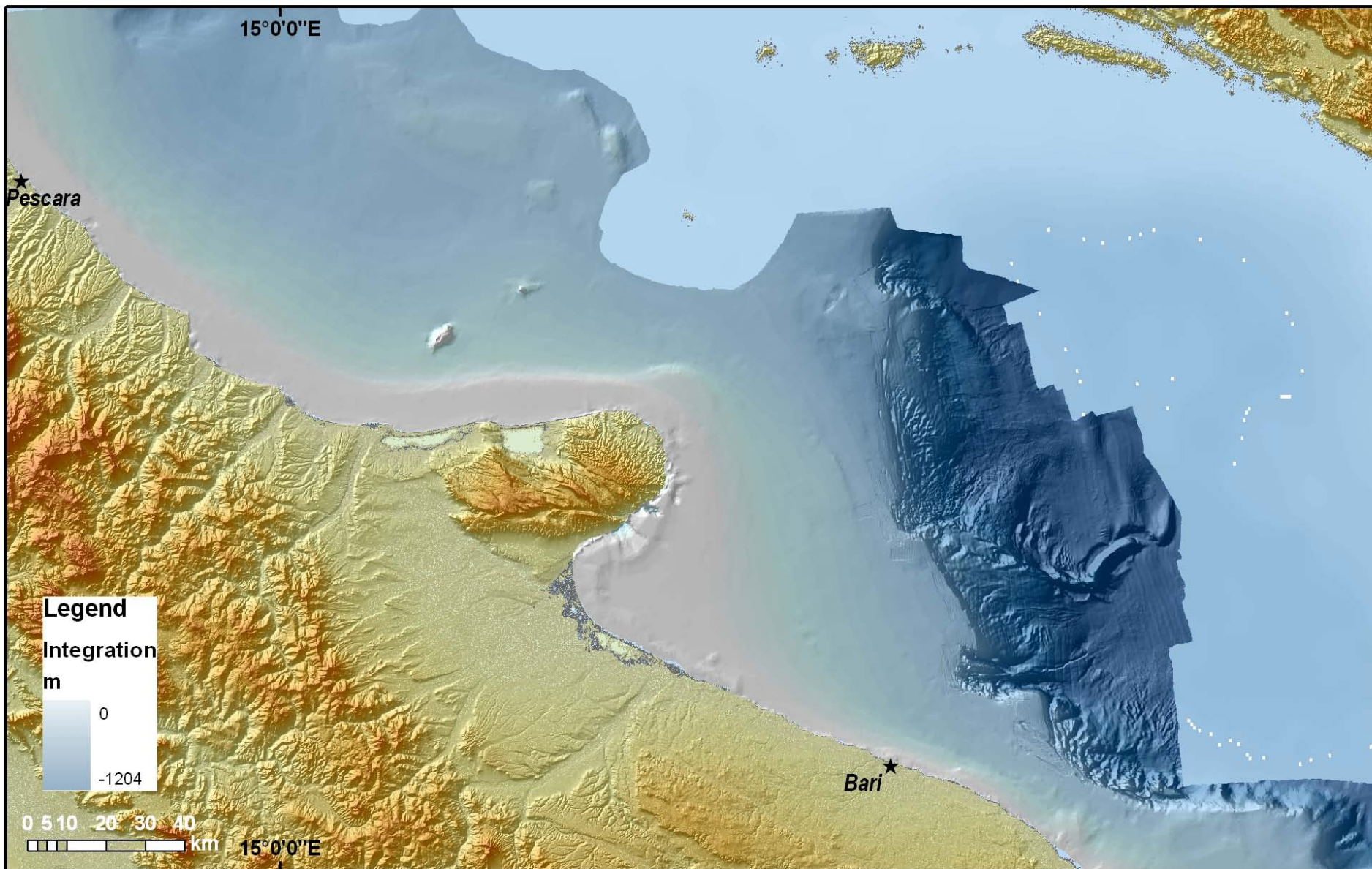
Variable Epsilon
model (TIN)



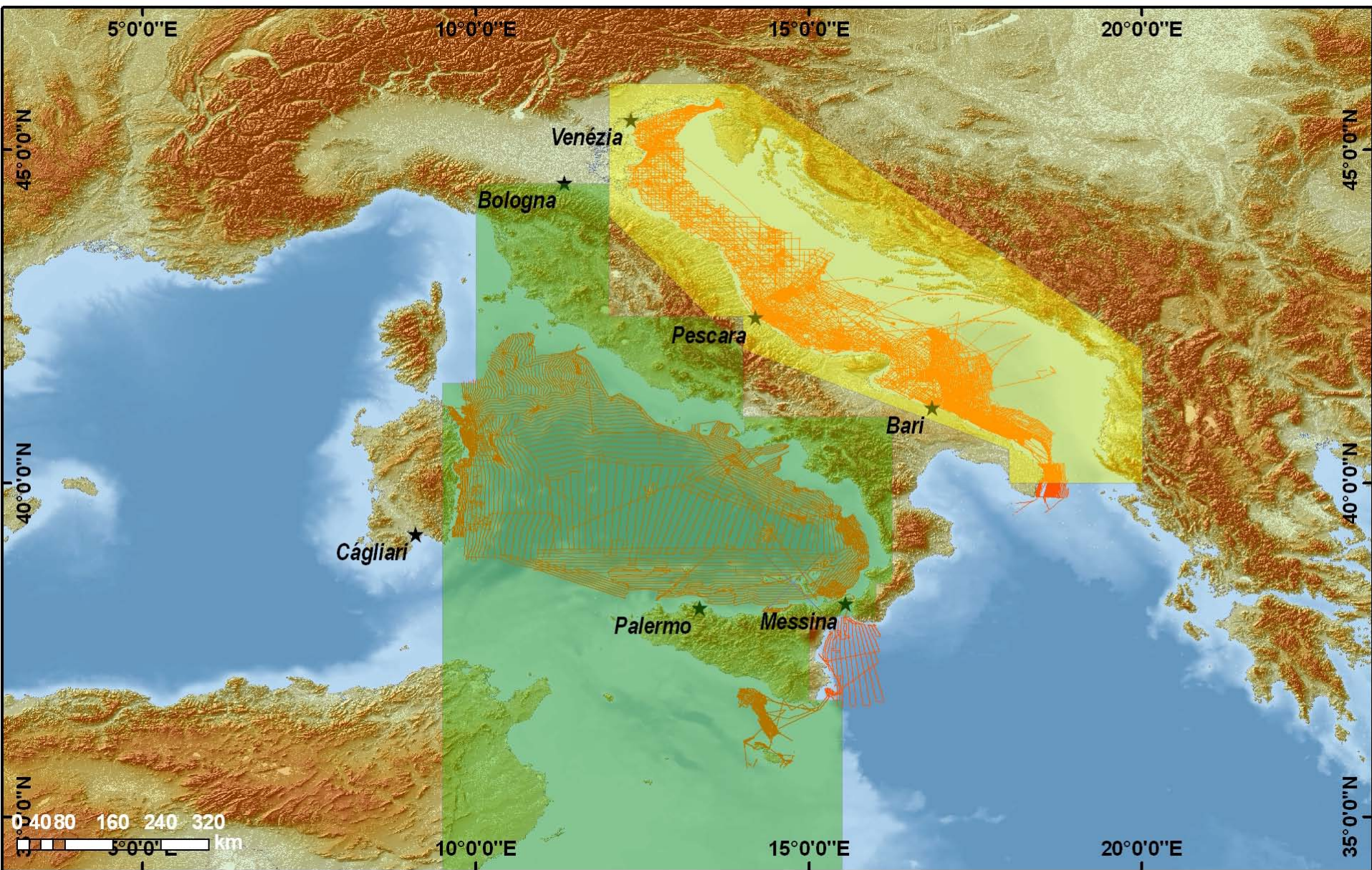
THE ADRIATIC SEA - SB and MB DATA INTEGRATION



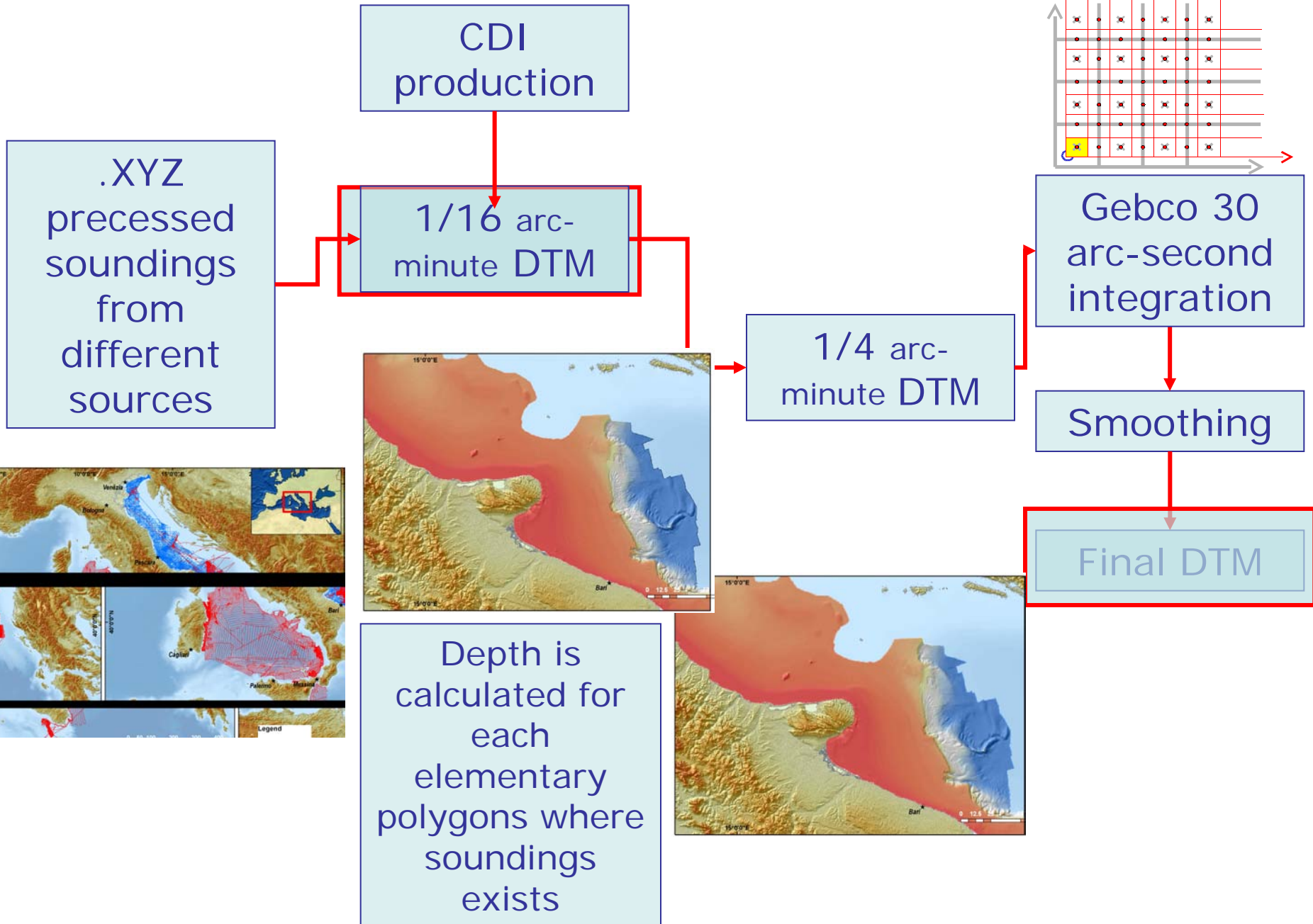
THE ADRIATIC SEA - SB and MB DATA INTEGRATION



EMODnet - Central Mediterranean sea DTM Regional Coordinator



EMODnet DTM procedure of production



EMODnet - Central Mediterranean sea

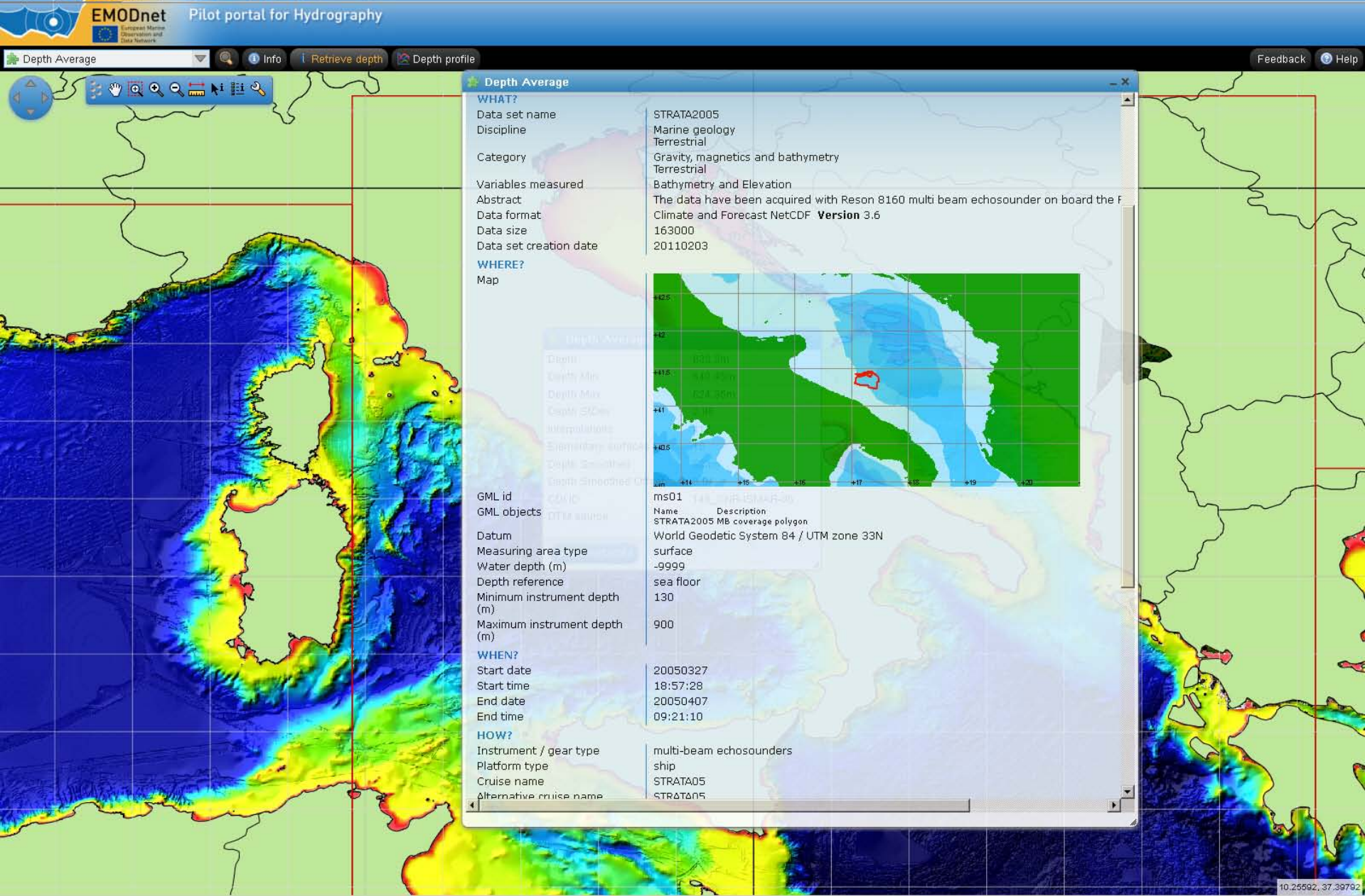
1/16 DTM
7 values

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  - Maximum value  : 10,000 meters
Layer name         : VSOUNDINGS (2/7)
  - Minimum value  : 1,000
  - Maximum value  : 807,000
Layer name         : MIN_SOUNDING (3/7)
  - Minimum value  : -1230,200 meters
  - Maximum value  : 10,000 meters
Layer name         : MAX_SOUNDING (4/7)
  - Minimum value  : -1230,200 meters
  - Maximum value  : 329,700 meters
Layer name         : STDEV (5/7)
  - Minimum value  : 0,000 meters
  - Maximum value  : 253,820 meters
Layer name         : CDI (6/7)
  - Number of values : 14
Layer name         : CDI_SOUNDINGS (7/7)
  - Minimum value  : 1,000
  - Maximum value  : 414,000
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Ellipsoid        : WGS-72
  a , b (meters)   : 6378135,000 , 6356750,520
  e2 , 1/flatness  : 0,006694318 , 298,260
Projection       : EQUIDISTANT CYLINDRICAL
  True scale parallel : NO
  Meridian origin    : E0
North latitude   : N42 30,09375
West longitude   : E13 59,90625
South Latitude   : N40 29,90625
East longitude   : E20 0,09375
```

FINAL DTM
10 values

1. Depth MIN
2. Depth MAX
3. Depth Average
4. Depth STD
5. Interpolation
6. Elementary surface
7. Depth smoothed
8. Depth smoothed offset
9. CDI ID
10. DTM SOURCE

EMODnet - Central Mediterranean sea



EMODnet - Central Mediterranean sea

EMODnet Pilot portal for Hydrography

Depth Standard deviation

Info Retrieve depth Depth profile

Feedback Help

<input type="radio"/>	Geographic grid	X	<input checked="" type="checkbox"/>	100	<input checked="" type="checkbox"/>	↓	
<input type="radio"/>	Download bathymetry as CSV files	X	<input type="checkbox"/>	100	<input checked="" type="checkbox"/>	↓	↑
<input type="radio"/>	Download bathymetry as SD files	X	<input type="checkbox"/>	100	<input checked="" type="checkbox"/>	↓	↑
<input type="radio"/>	Download bathymetry as xyz files	X	<input type="checkbox"/>	100	<input checked="" type="checkbox"/>	↓	↑
<input type="radio"/>	Download bathymetry as ESRI ASCII files	X	<input checked="" type="checkbox"/>	100	<input checked="" type="checkbox"/>	↓	↑
<input type="radio"/>	Download bathymetry as NetCDF files	X	<input type="checkbox"/>	100	<input checked="" type="checkbox"/>	↓	↑
<input type="radio"/>	Download bathymetry as Geotiff files	X	<input type="checkbox"/>	100	<input checked="" type="checkbox"/>	↓	↑
<input type="radio"/>	Global coastline (GSHHS)	X	<input checked="" type="checkbox"/>	100	<input checked="" type="checkbox"/>	↓	↑
<input type="radio"/>	Source Reference	X	<input type="checkbox"/>	100	<input checked="" type="checkbox"/>	↓	↑
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Add layer

http://www.emodnet-hydrography.eu/content/content.asp?menu=0310019_000000

5.63068, 46.5716

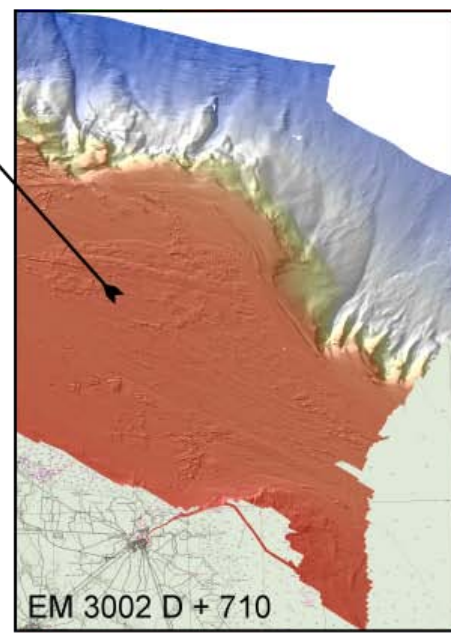
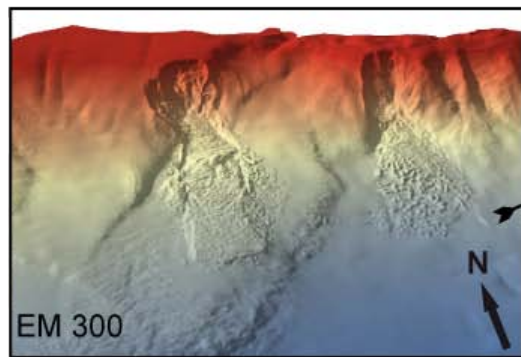
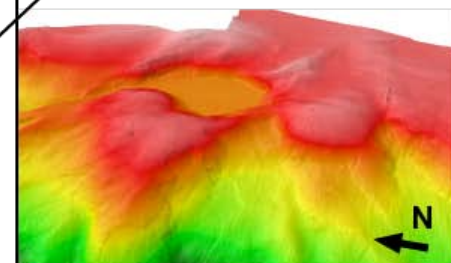
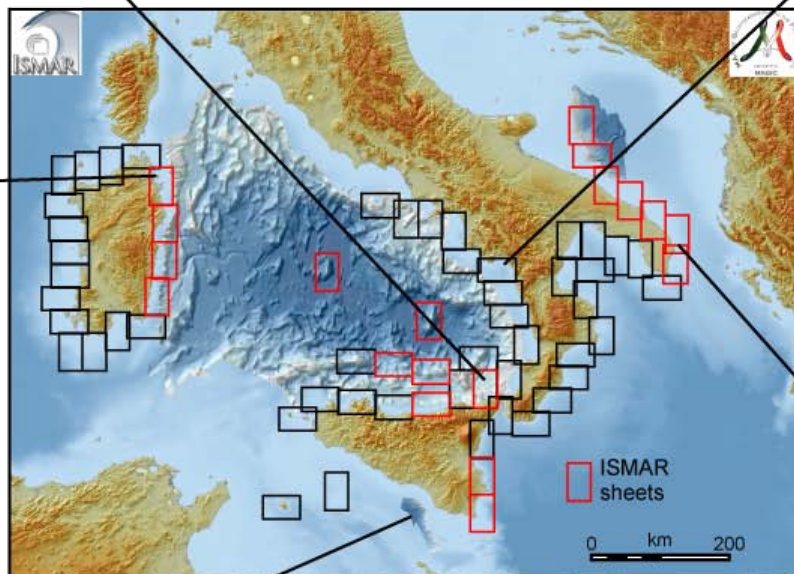
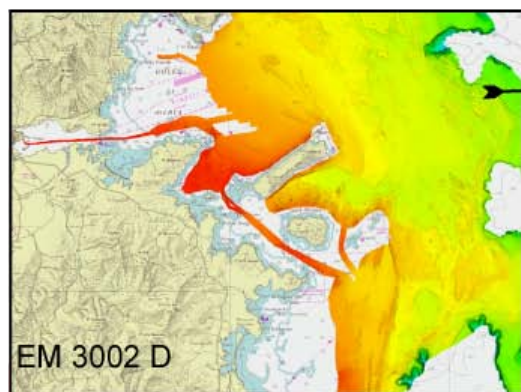
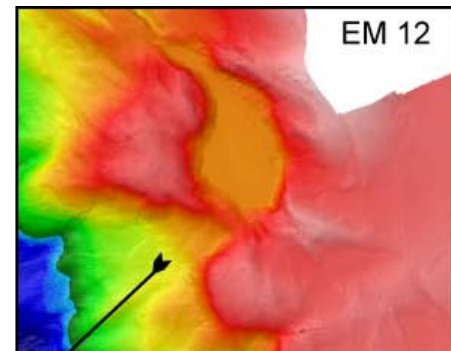
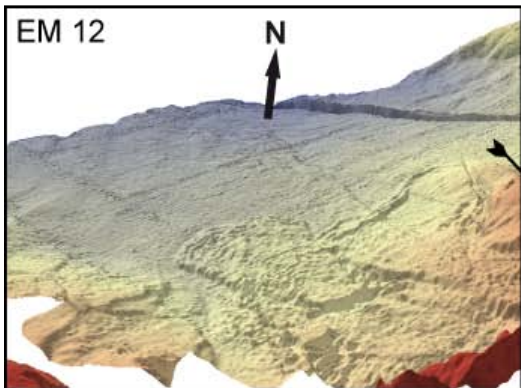
WHY BATHYMETRY??

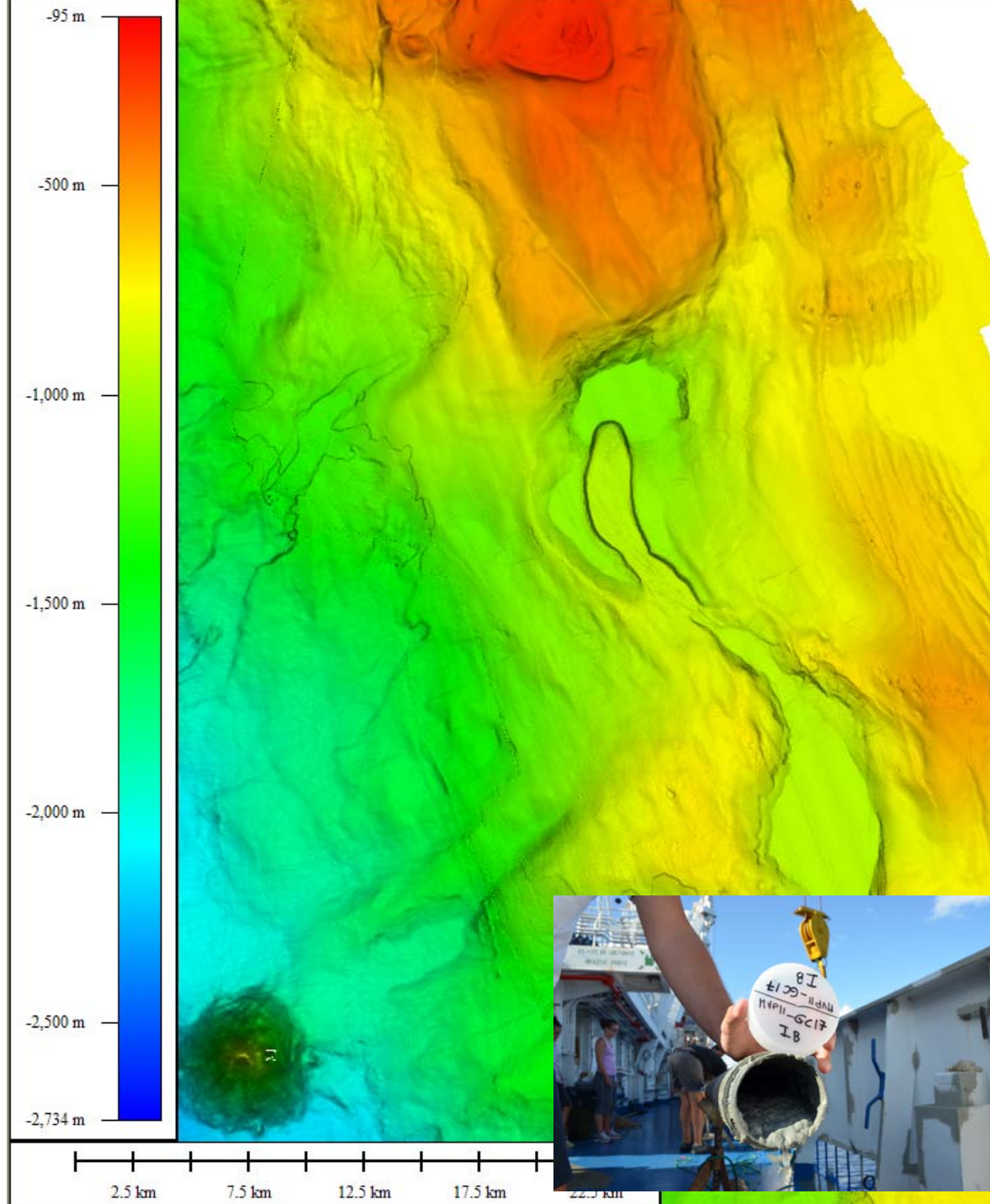
- Oceanography
- **Geology and Geohazard assessment**
- **Habitat mapping**

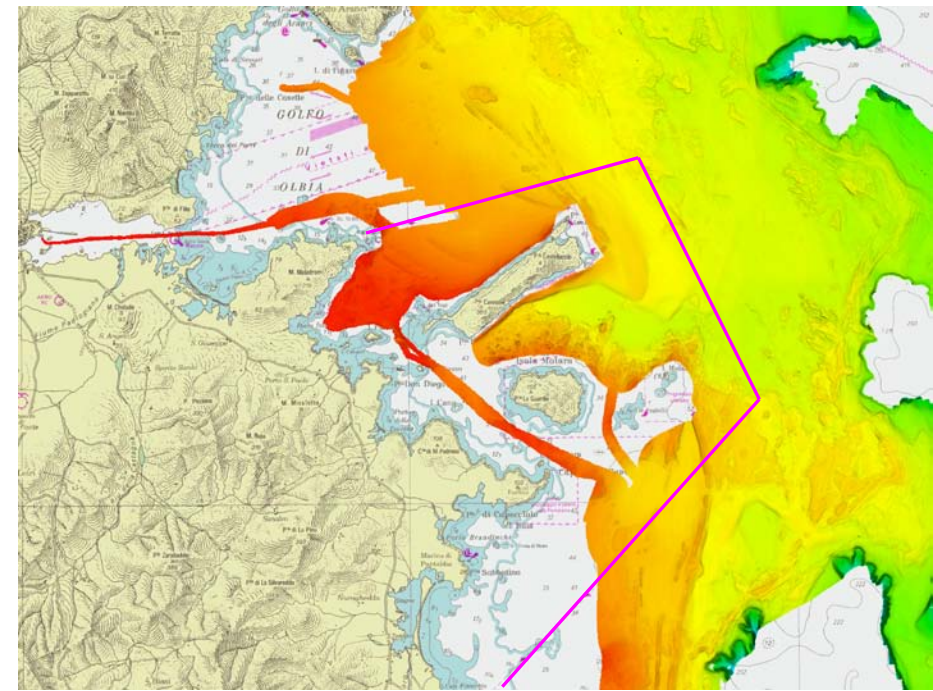
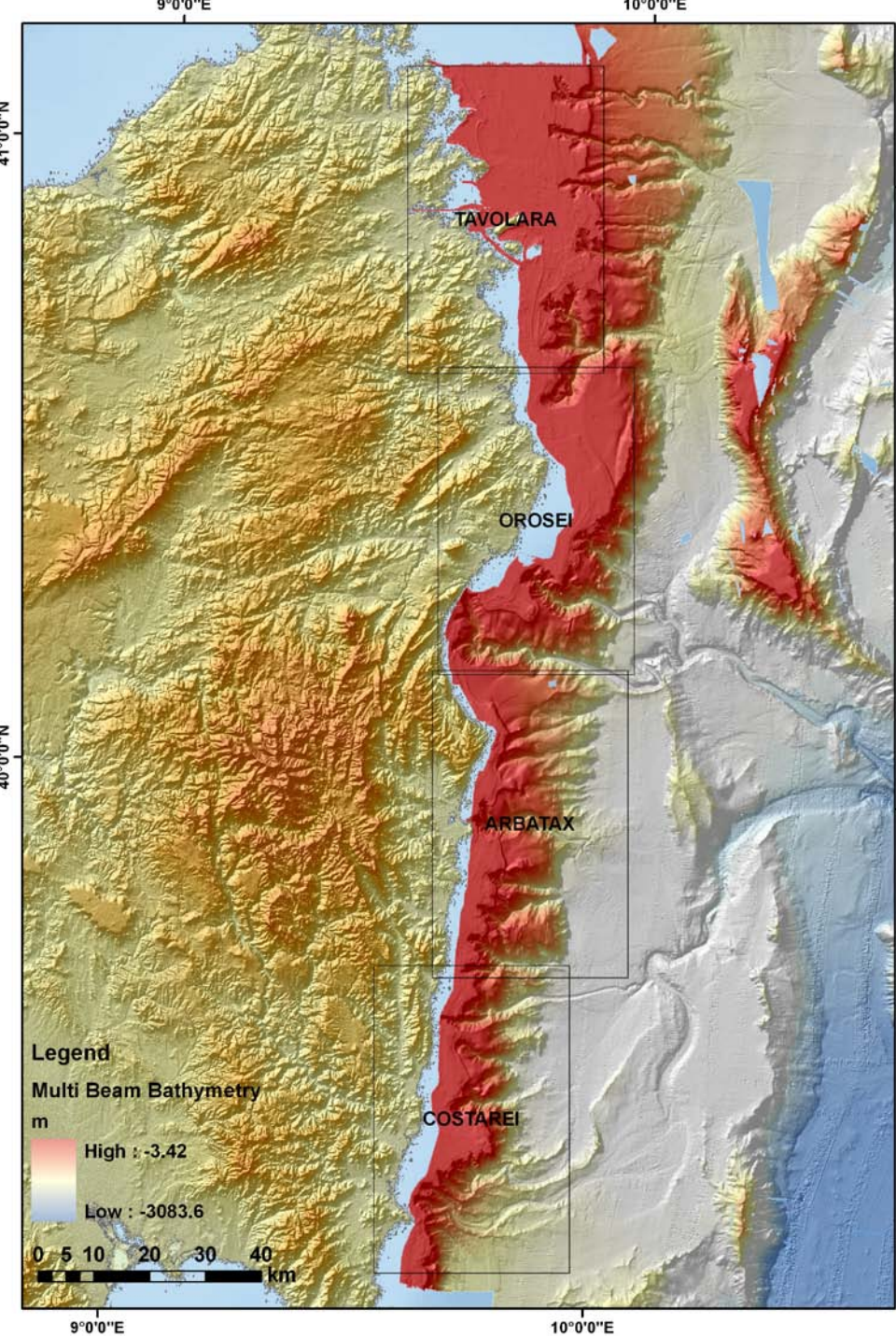
SOME EXAMPLES

By

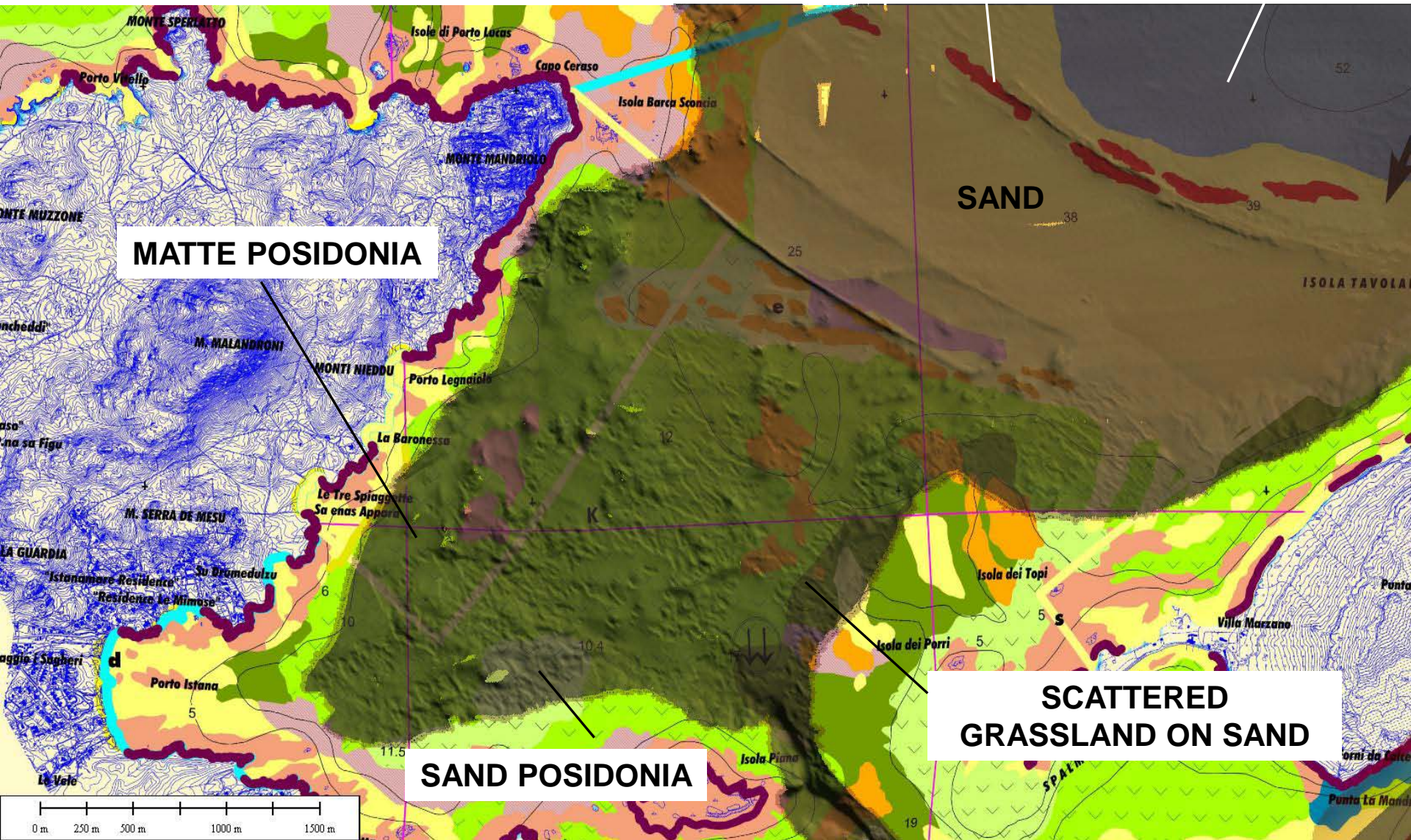
Marzia Rovere

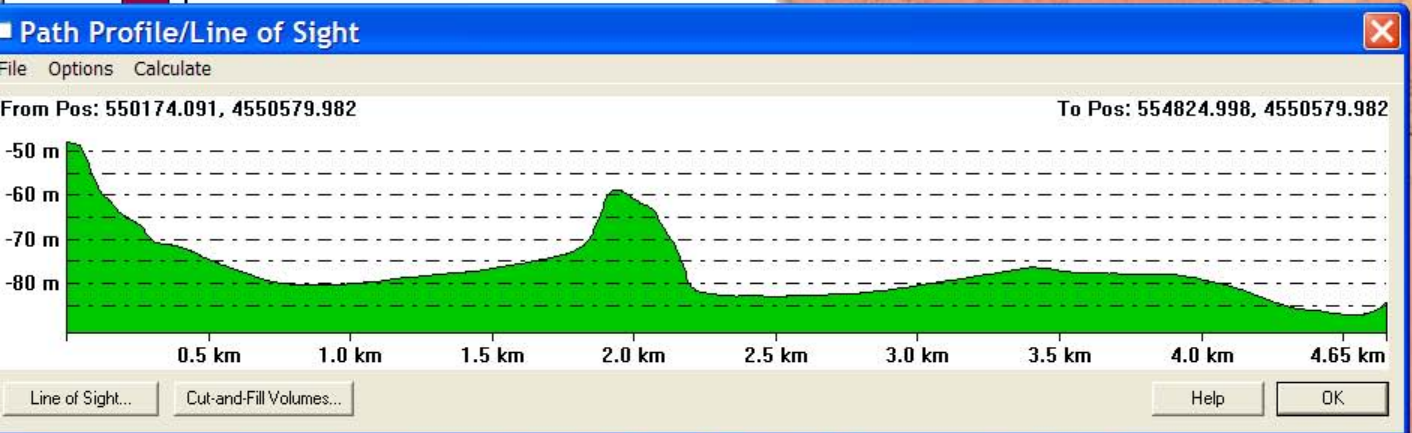


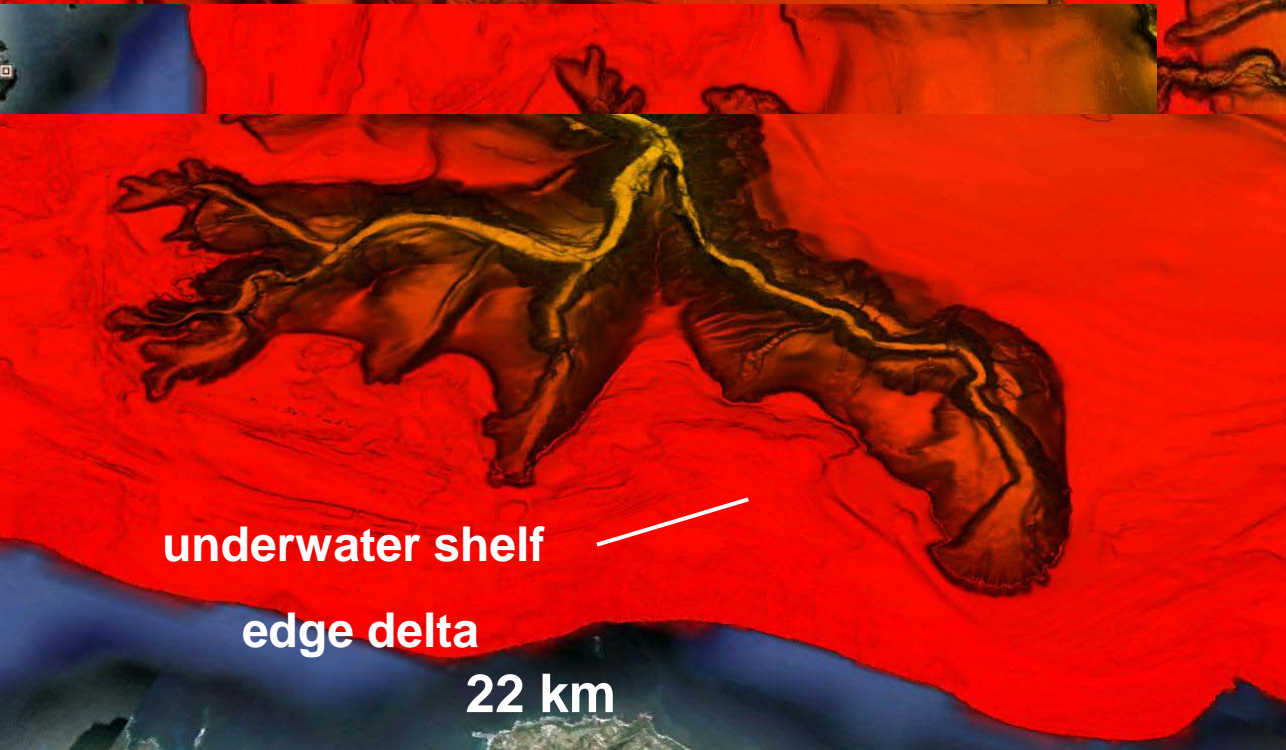
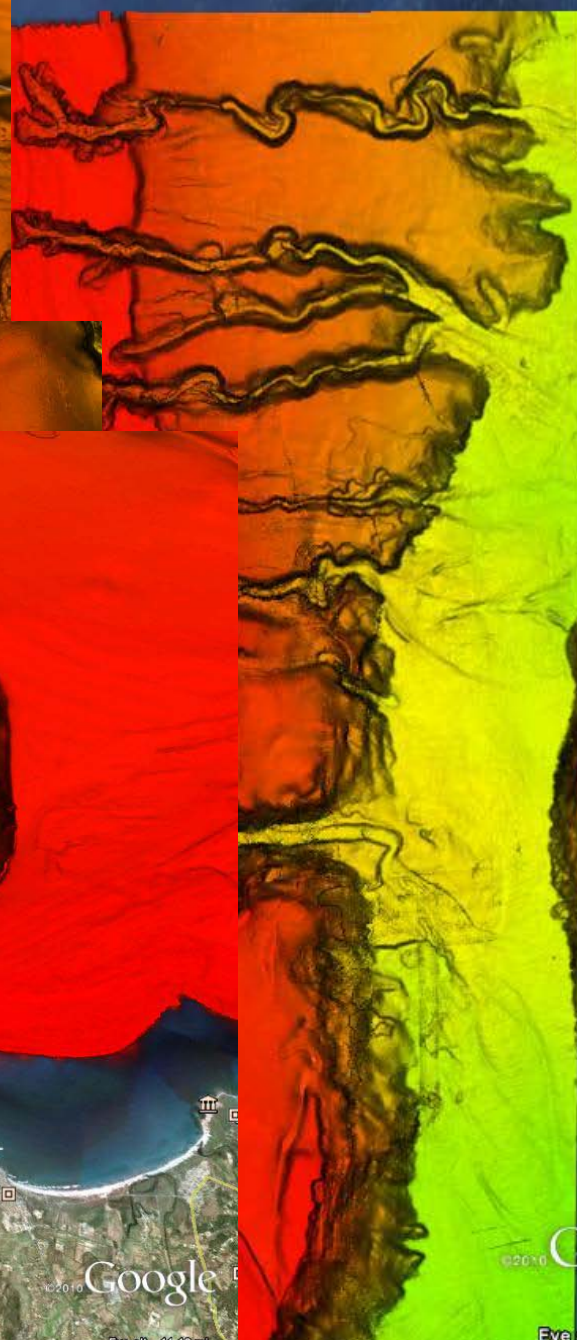




BIONOMICS CHART







SS131DcN

4 km

Tortoli--Genova

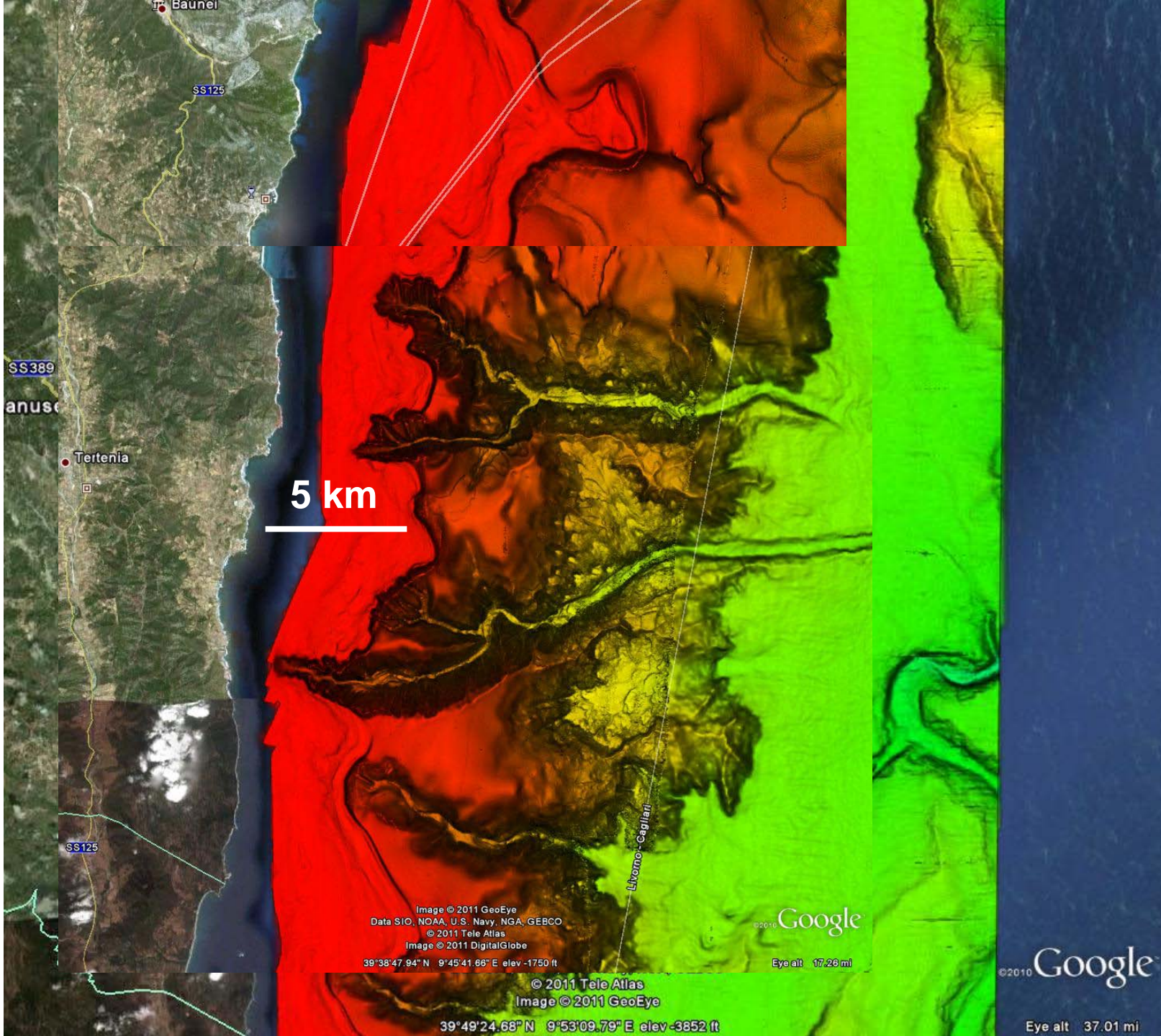
Fiumicino--Tortoli
Civitavecchia--Tortoli

Image © 2011 DigitalGlobe
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2011 Tele Atlas
Image © 2011 GeoEye

40°04'10.53" N 9°48'53.78" E elev -1625 ft
40°13'57.87" N 9°53'09.67" E elev -2110 ft

Google
©2010 Google

Eye alt 15.64 mi
Eye alt 37.01 mi



5 km

Baunei

SS125

SS389

anuse

Tertenia

Livorno-Cagliari

Google

Image © 2011 GeoEye
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2011 Tele Atlas
Image © 2011 DigitalGlobe

39°38'47.94" N 9°45'41.86" E elev -1750 ft

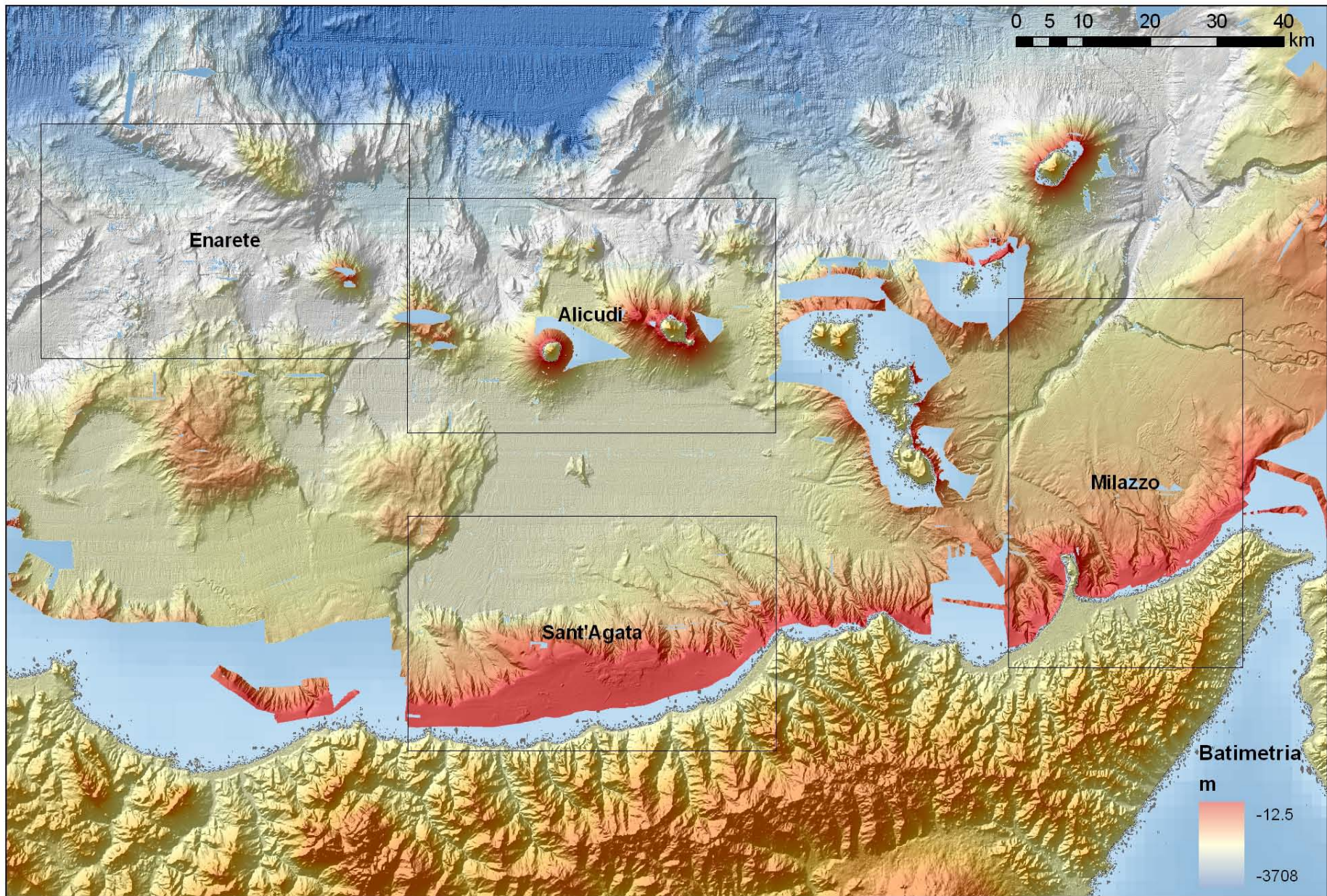
Eye alt 17.26 mi

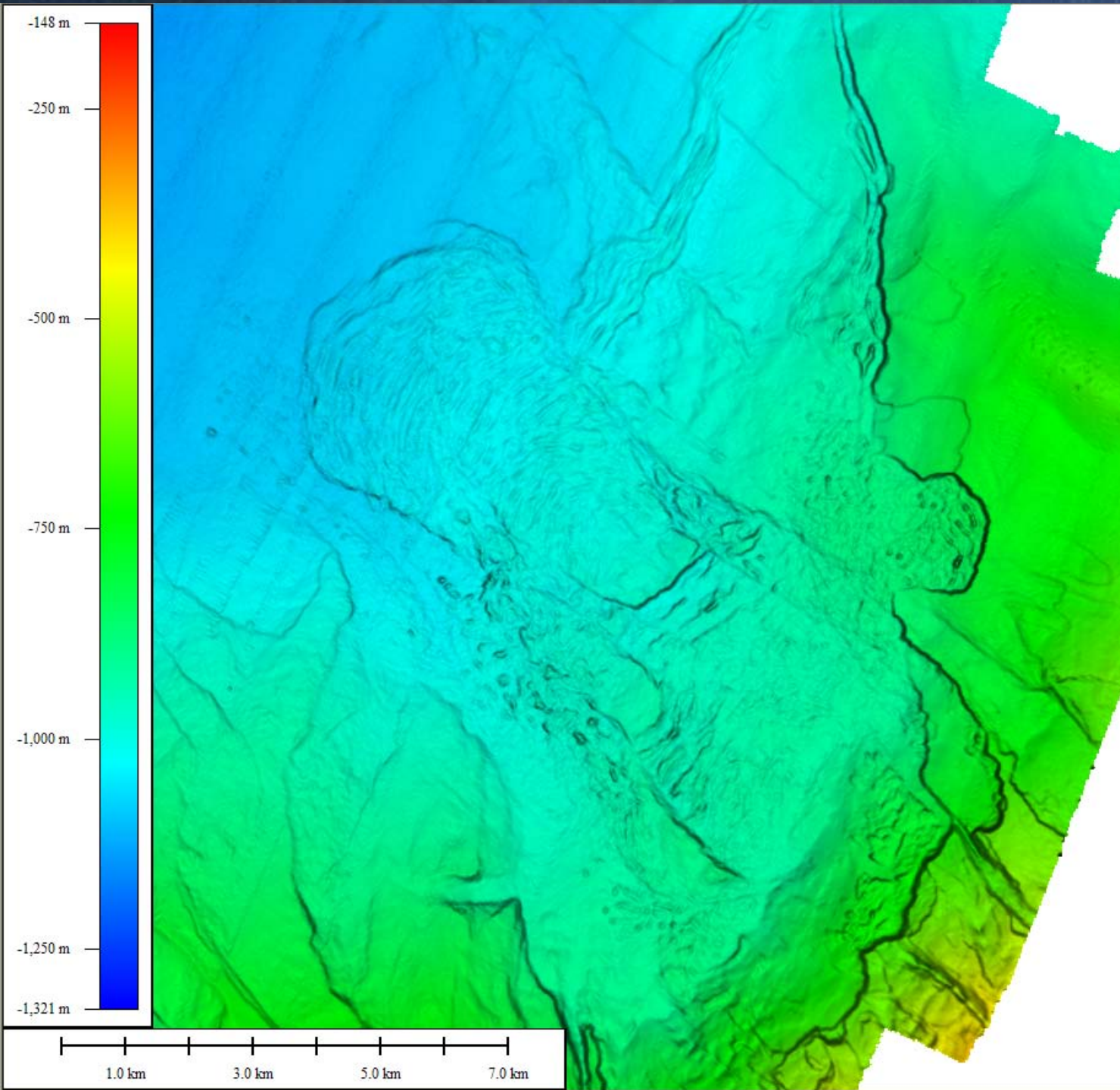
© 2011 Tele Atlas
Image © 2011 GeoEye

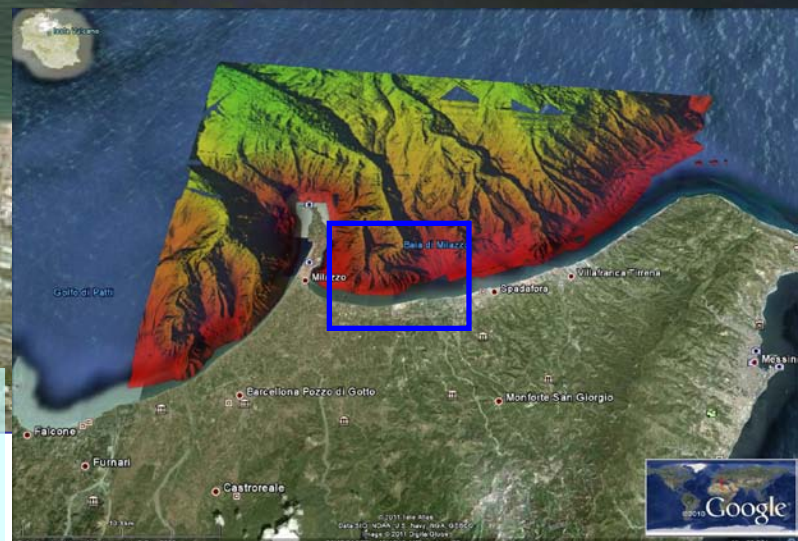
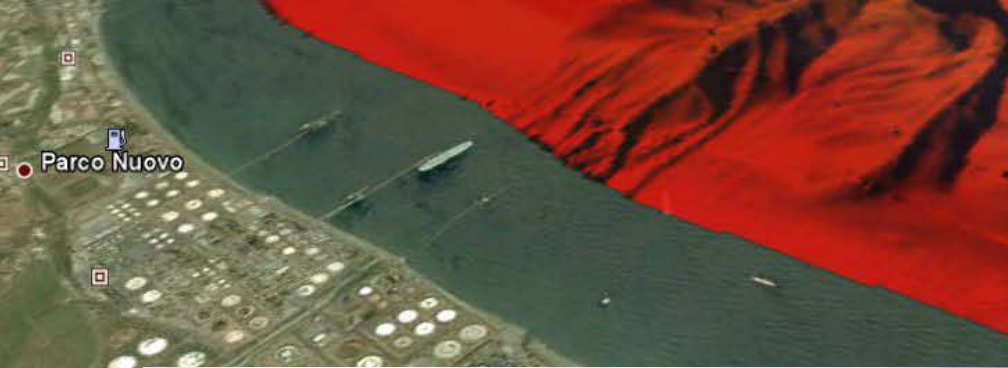
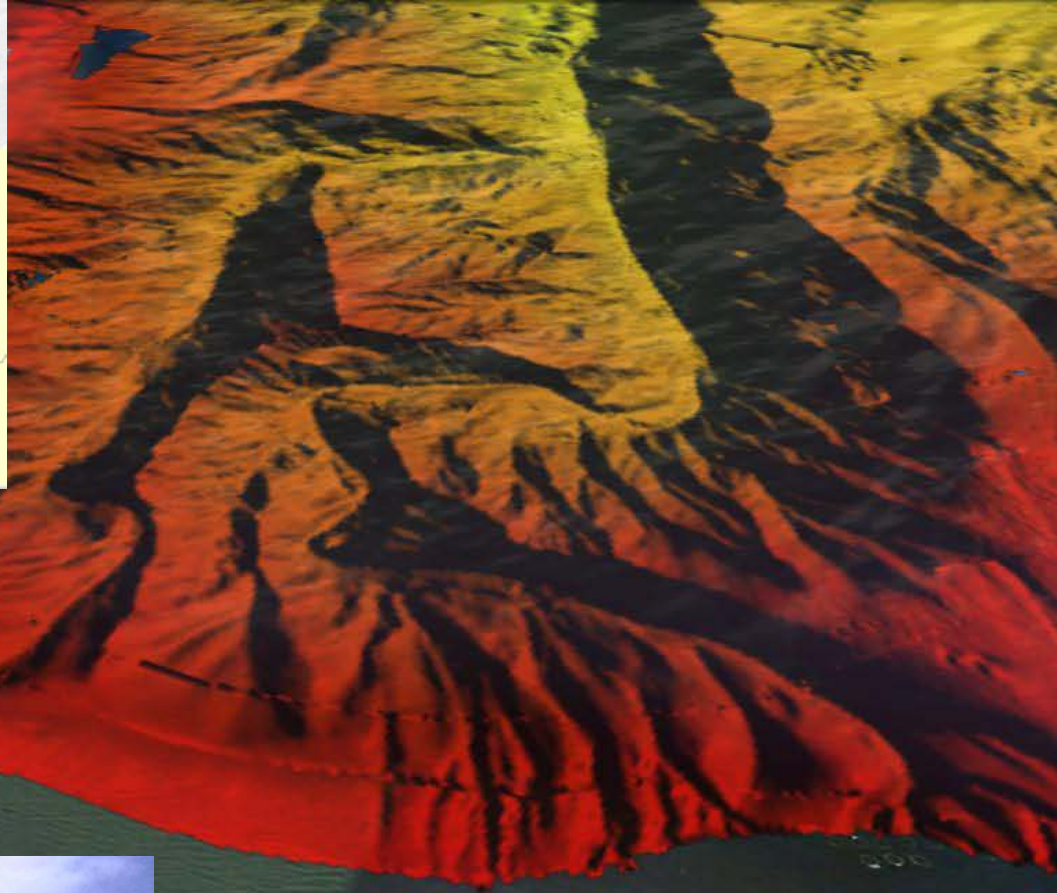
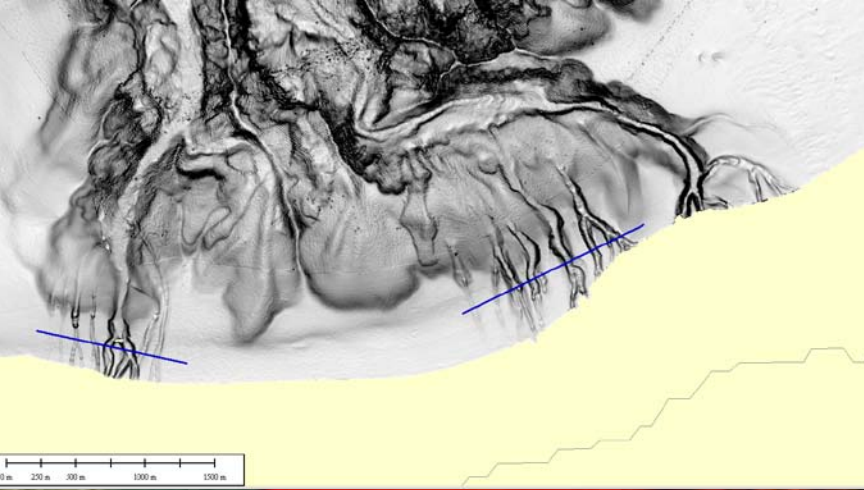
39°49'24.68" N 9°53'09.79" E elev -3852 ft

©2010 Google

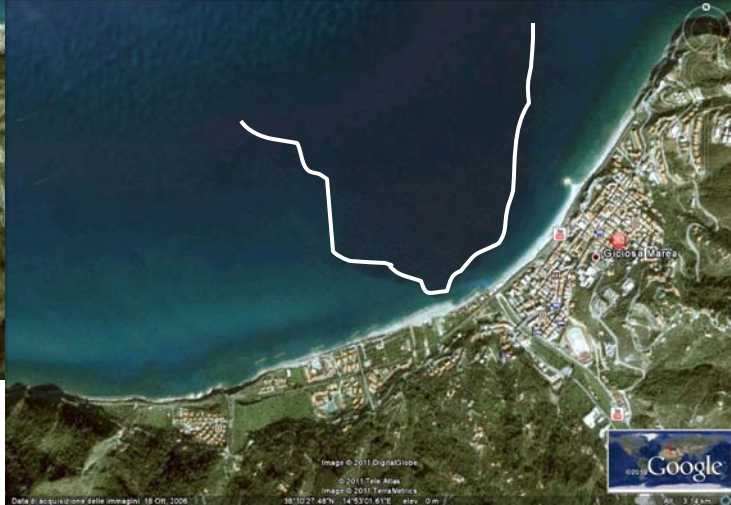
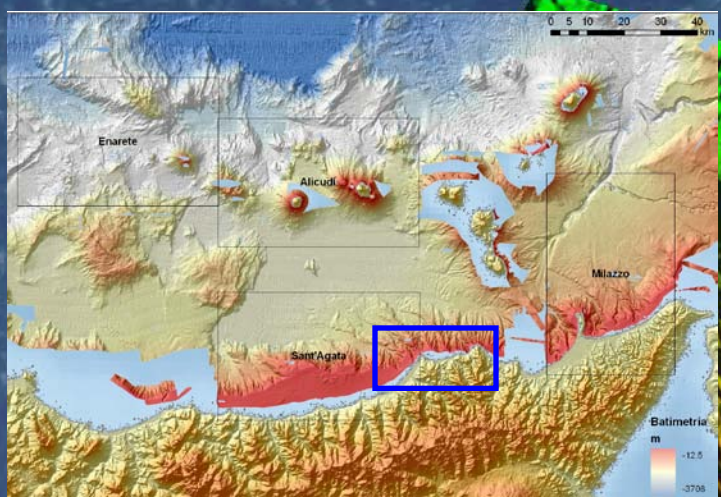
Eye alt 37.01 mi







Near shore canyons: Niceto Canyon
oil refinery plant in Milazzo



Near shore canyons: Gioiosa Marea
Touristic place

CONCLUSIONS

CNR-ISMAR collected huge amount of bathymetric data in the Central Mediterranean Sea in the framework on National and European projects.

Bathymetric data processing and merging is one of the main challenge because of different data sources, systems, resolution and water depth

CNR-ISMAR is able to make the bathymetric data available to the global community in the framework of EMODnet, following EMODnet QA/QC Standard

Bathymetry is fundamental for many scientific issues and applications from oceanography to geology