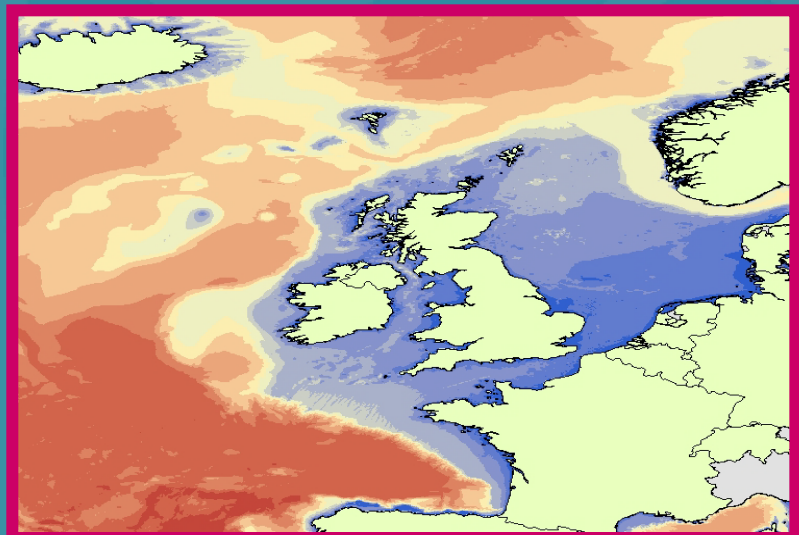
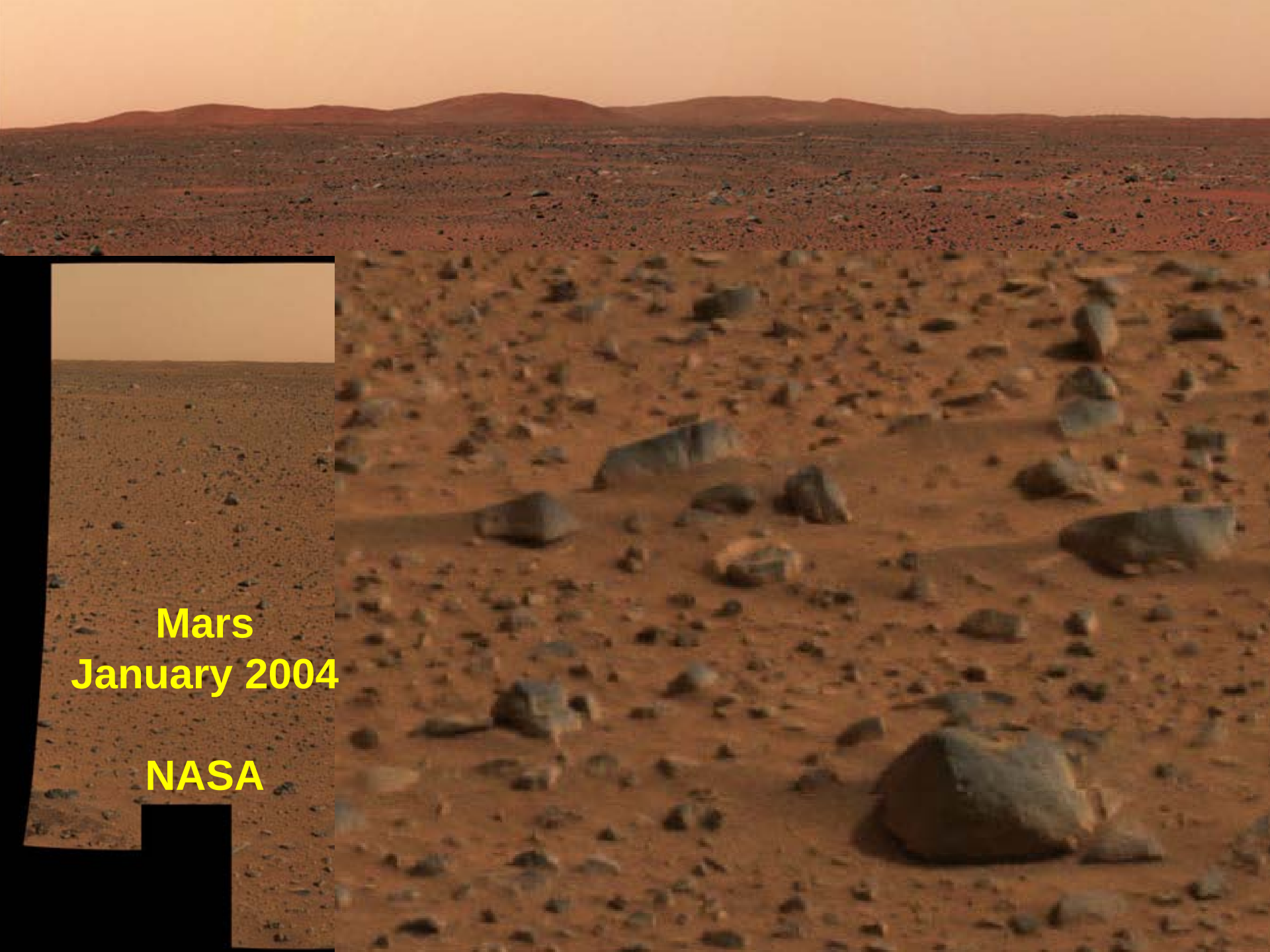
David Connor

Joint Nature Conservation Committee

Prospects for a seabed and habitat map of Europe




29 Rue Pierre Demours, Paris, France
Address is approximate
« Photos
C Comme Cheveux
Rue Pierre Demours / Rue du Sergent Hoff
Rue Pierre Demours
Quality Astor Etoile
© 2010 Google
Report a problem


Mars
January 2004
NASA

Why map the seabed?

Maritime safety

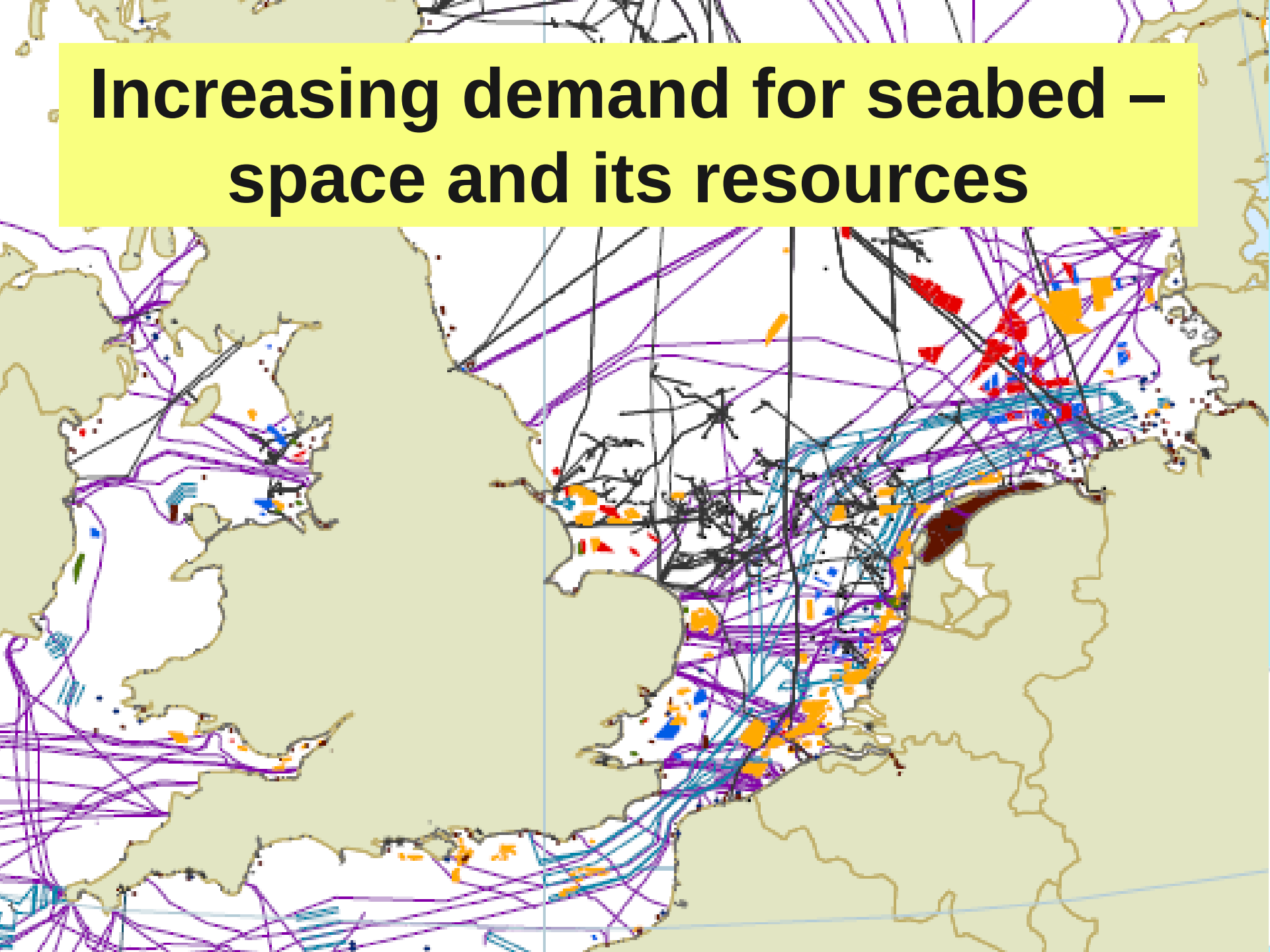
Human uses and activities

Knowledge & understanding

Marine ecosystem protection

Sustainable ecosystems

Increasing demand for seabed – space and its resources



Increasing drive to protect the marine environment

Marine Strategy Framework Directive

- Achieve Good Environmental Status by 2020

Maintenance of:

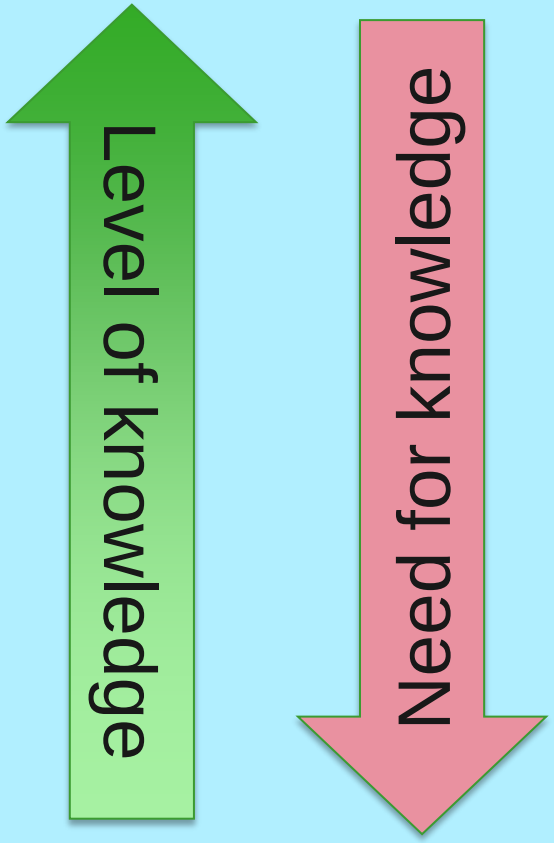
- Biodiversity, including seabed habitats
- Seafloor integrity

Need to:

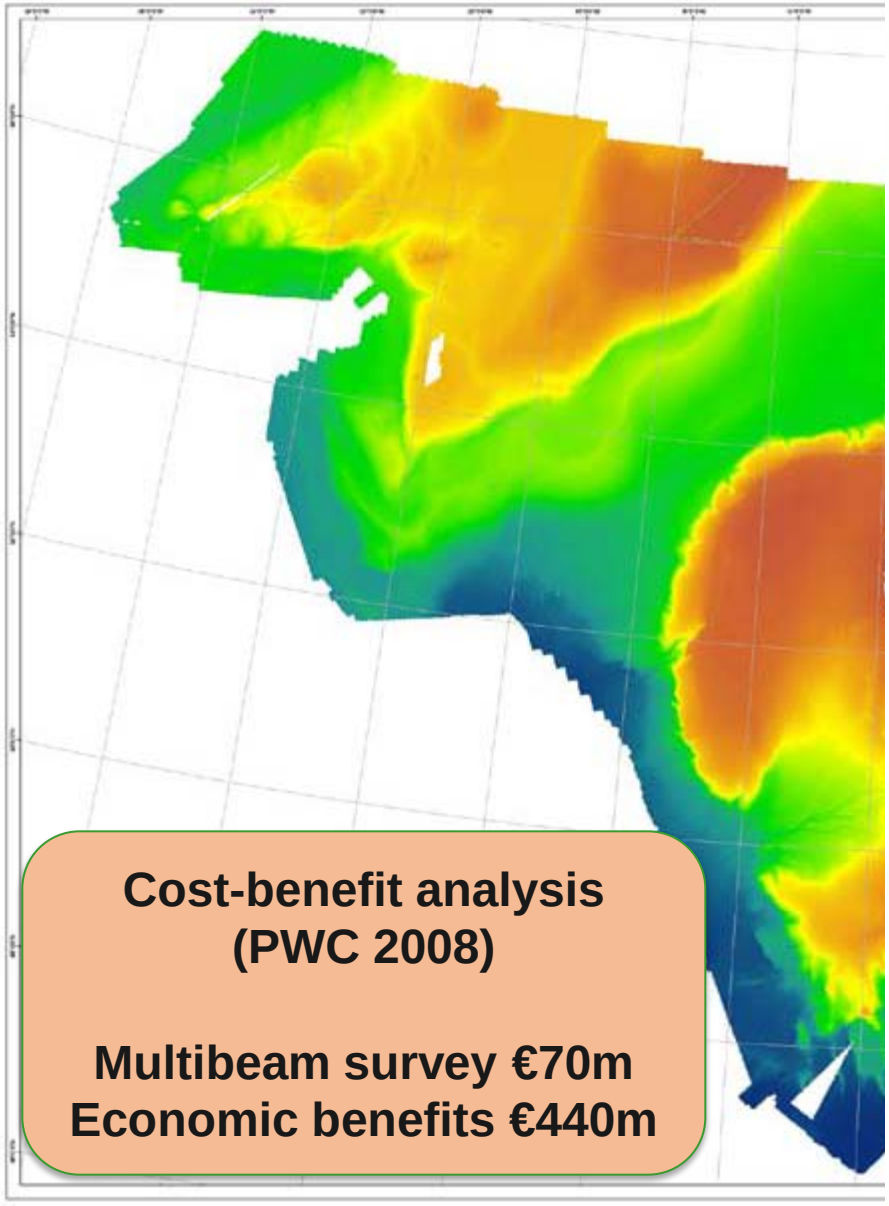
- Characterise and assess predominant habitat types
- Assess pressures from human activities
- Map special habitats (listed by EC Directives and Conventions)
- Designate a network of Marine Protected Areas

Seabed mapping – key elements

- Topography and bathymetry
- Physical character – substrate types, bed-forms
- Biological character – habitat types, biological samples

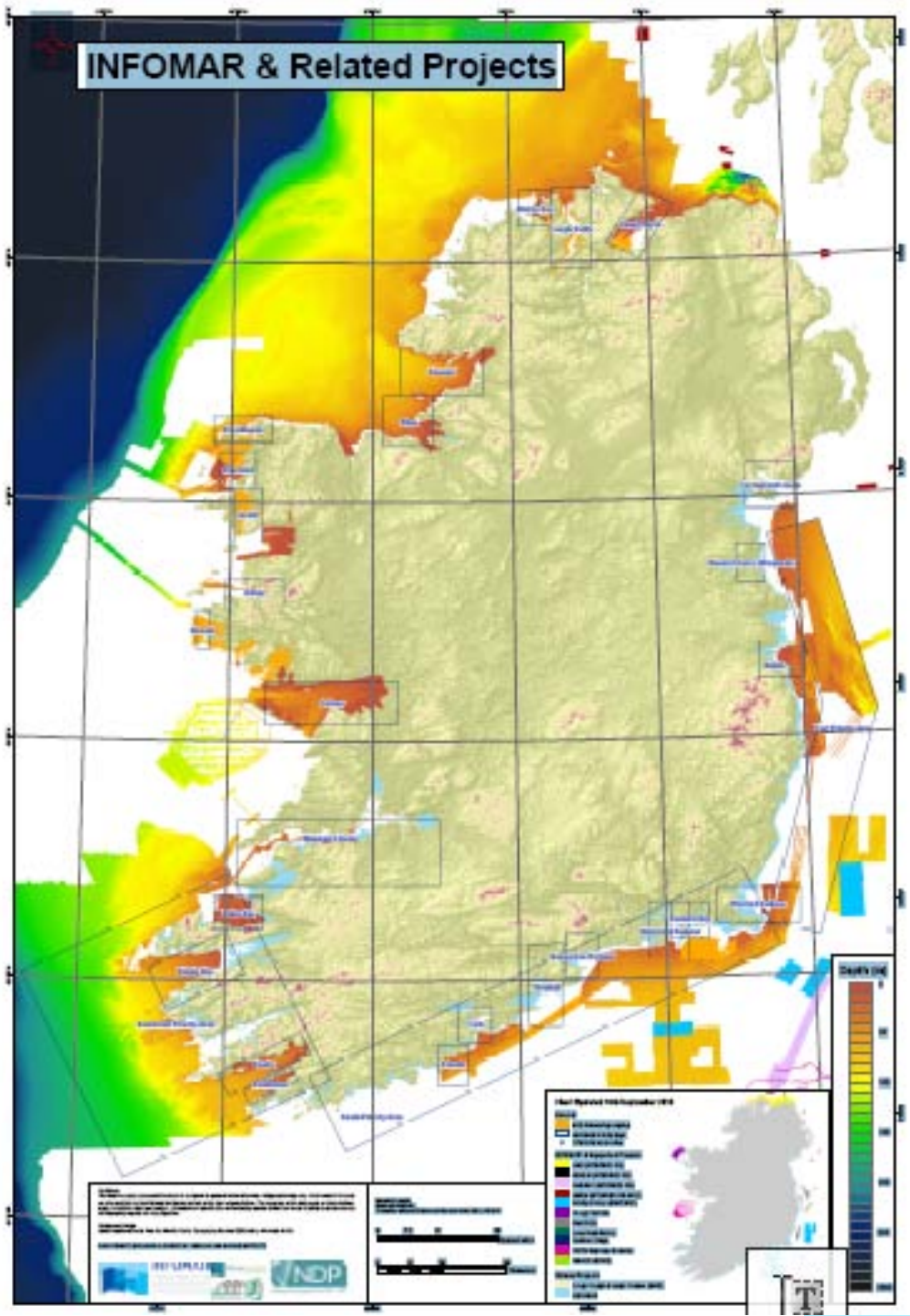


INSS & INFOMAR

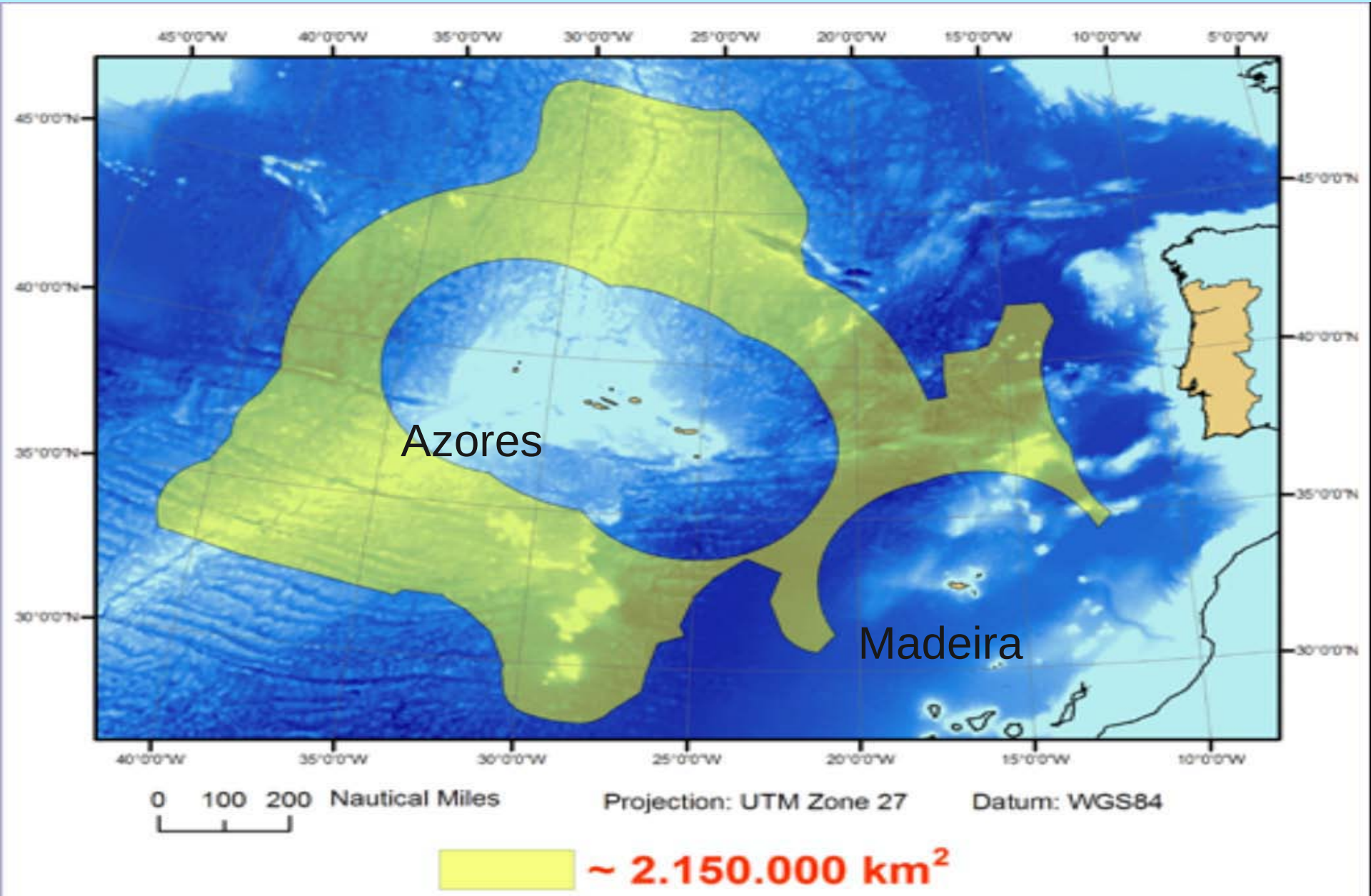


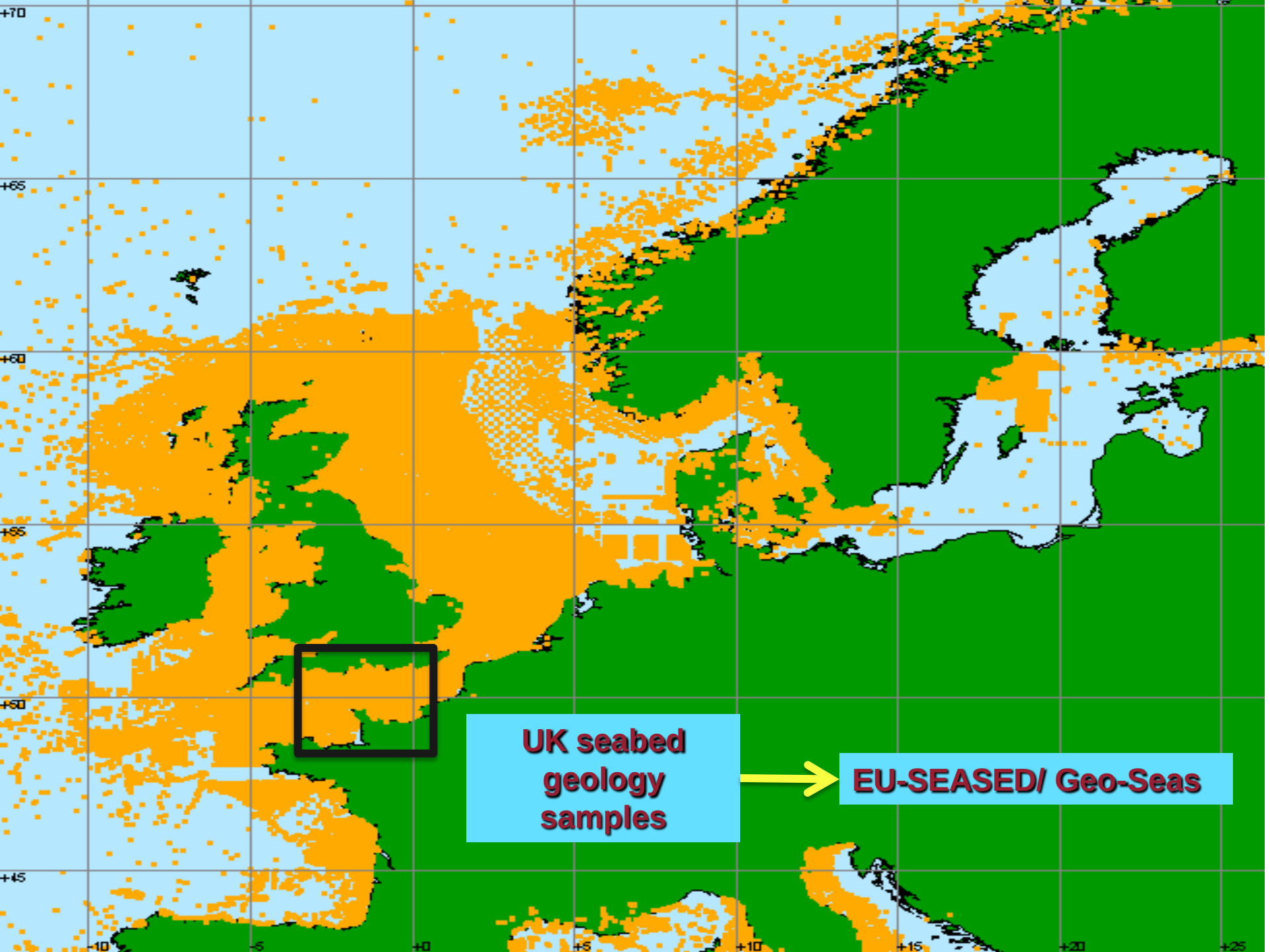
Cost-benefit analysis (PWC 2008)

Multibeam survey €70m
Economic benefits €440m



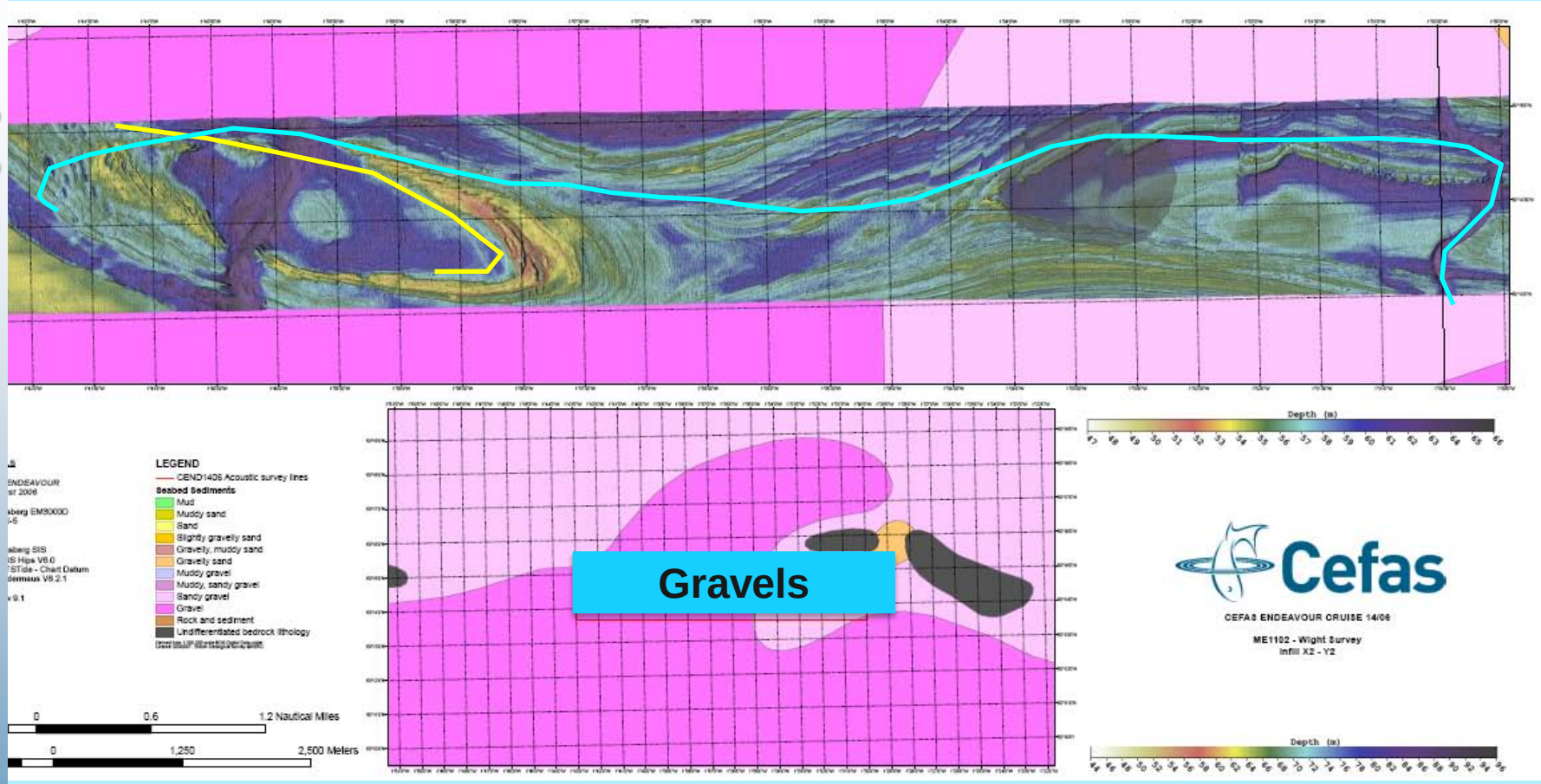
Portugal – extension to continental shelf area




+70
+65
+60
+55
+50
+45
-10
-5
+0
+5
+10
+15
+20
+25
UK seabed geology samples
EU-SEASED/ Geo-Seas

Eastern Channel

State of the art 3D mapping



1 WightX2Y2_1.mpg

2 WightX2Y2_long.mpg

www.searchMESH.net

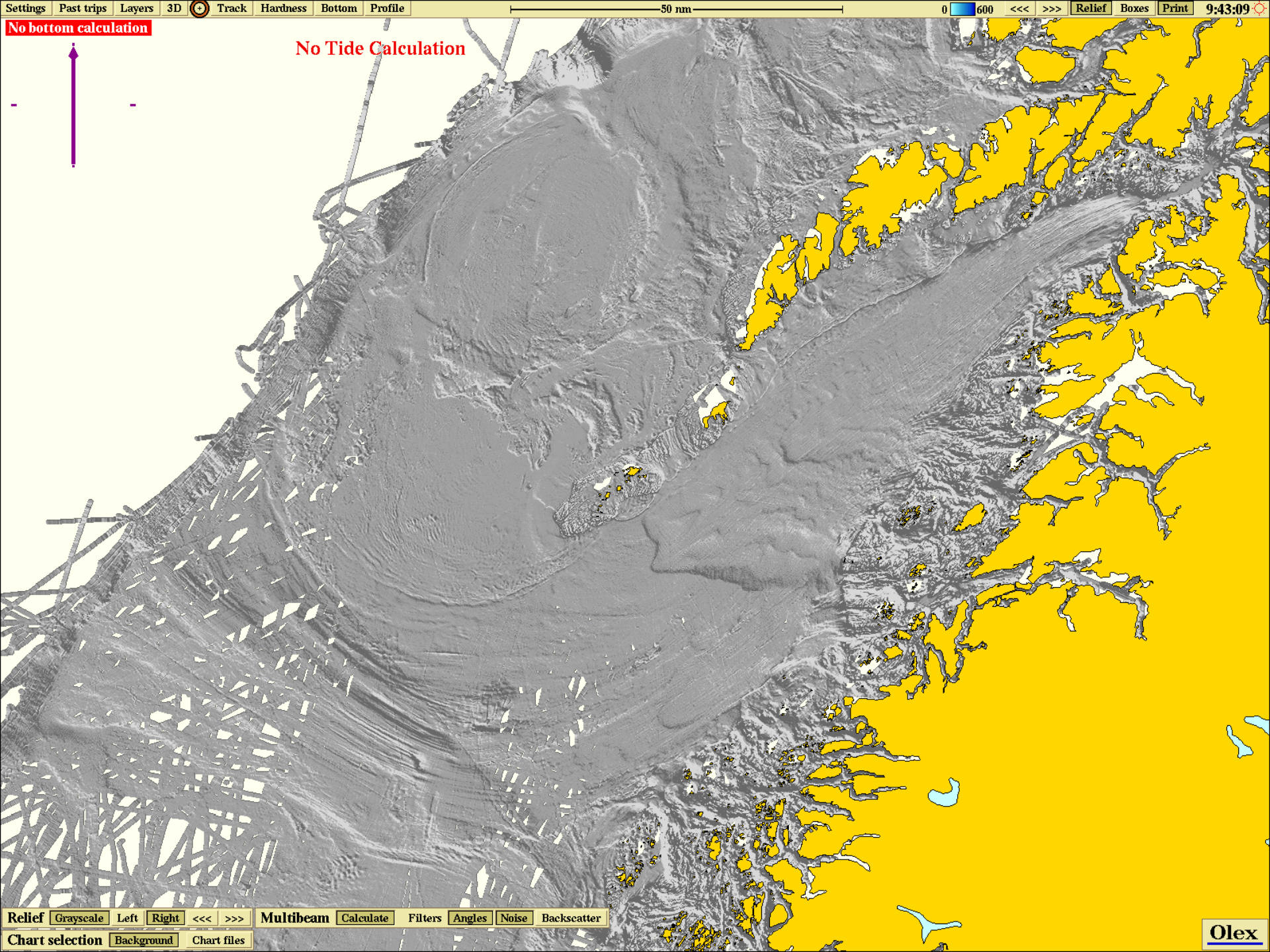

Settings
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Chart selection
Background
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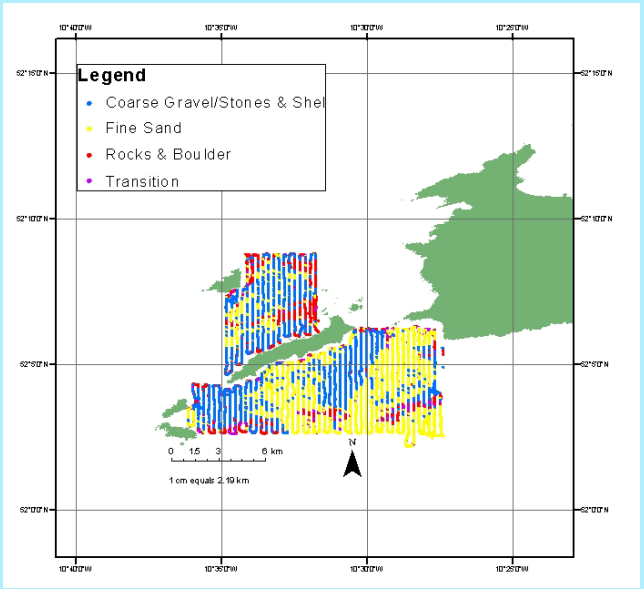
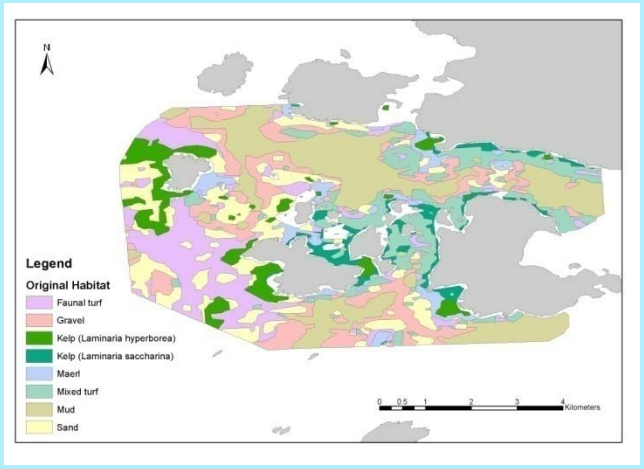
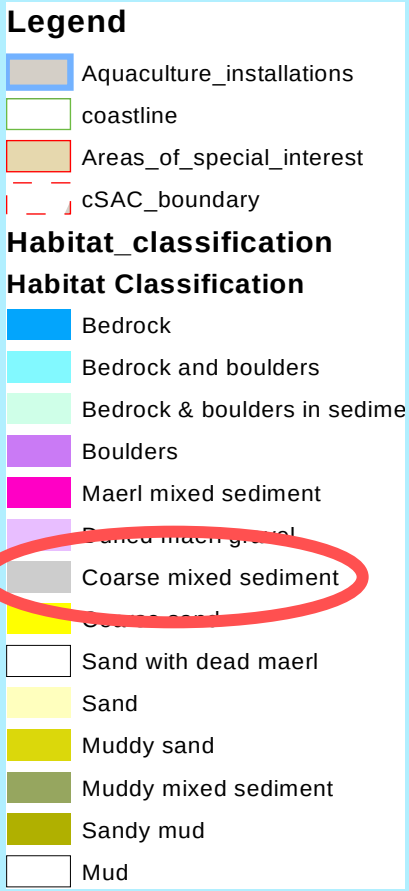
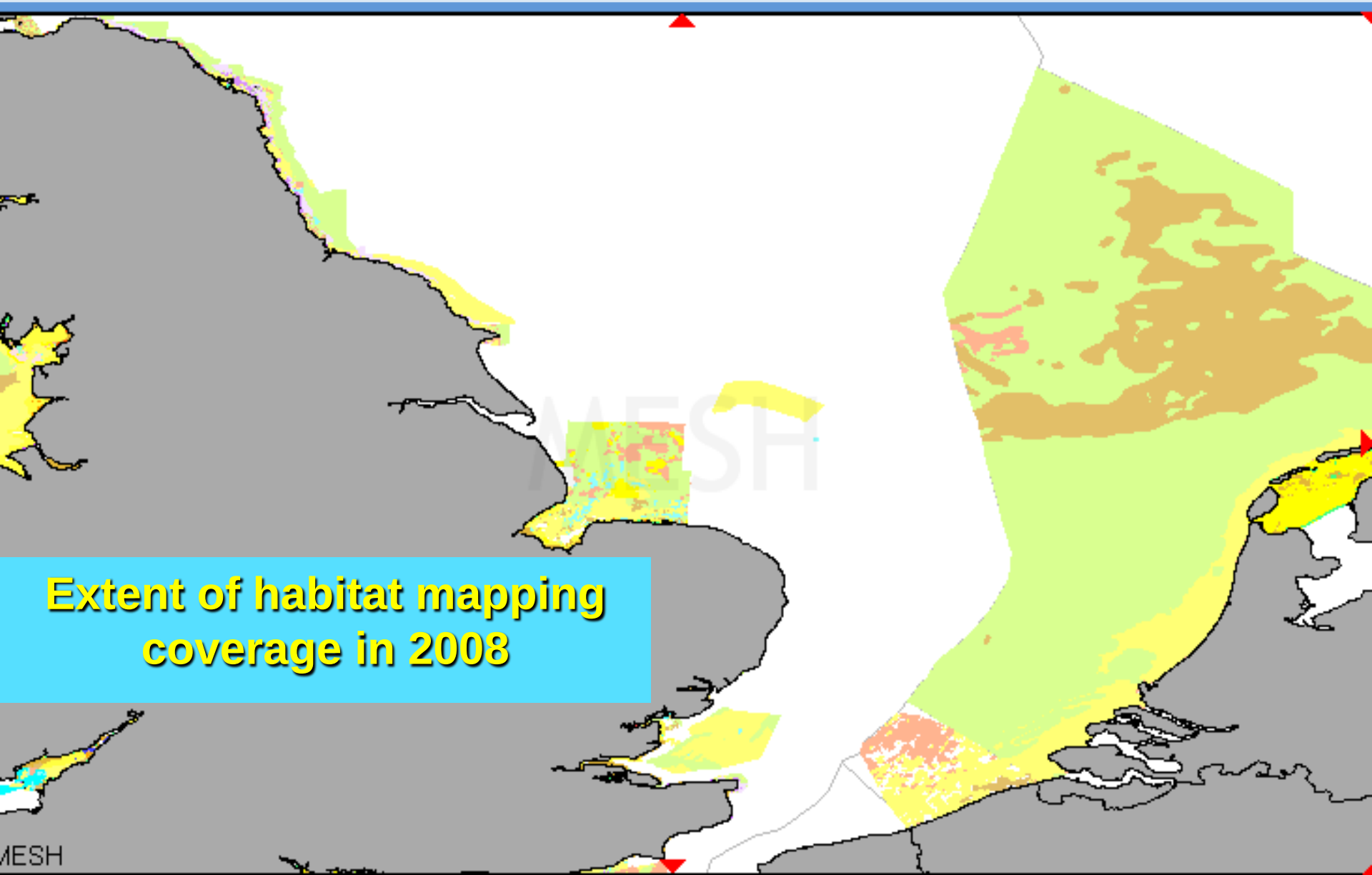
Maps without a common language



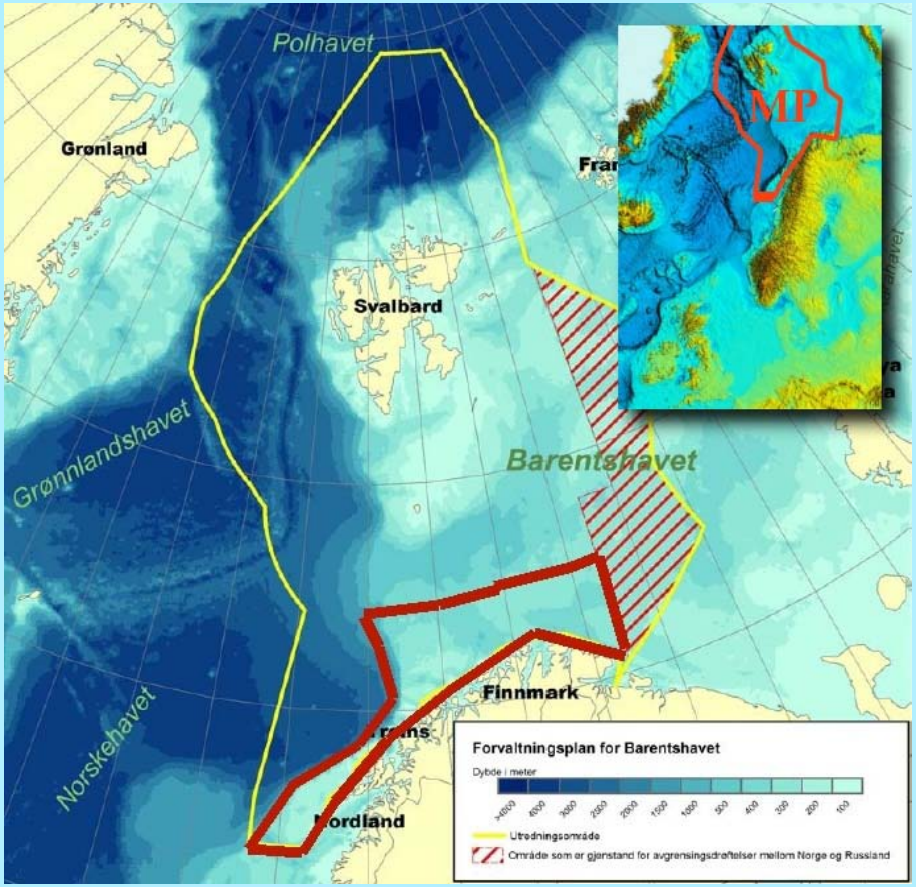




MESH MAPPING EUROPEAN SEABED HABITATS



Norway
MAREANO

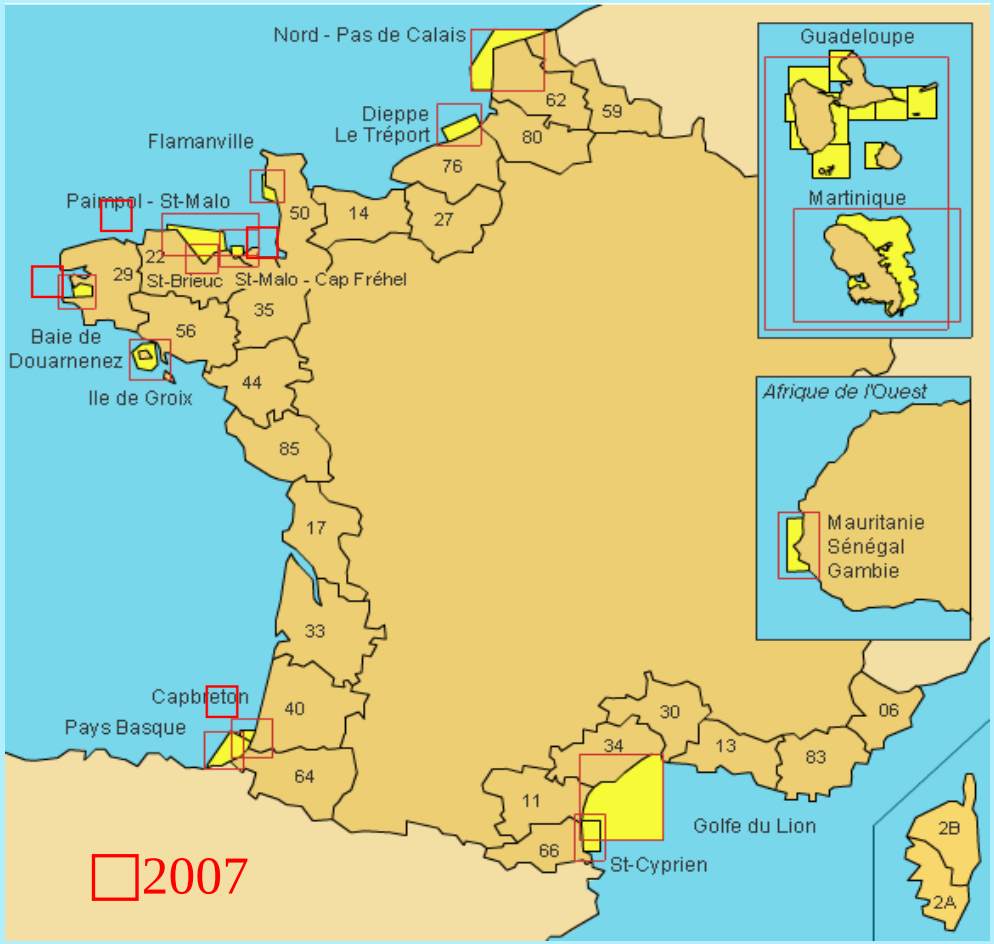


- Vulnerable resources – very rich fisheries
- Considerable hydrocarbon resources
- Potential conflicts
- Management plans for holistic ecosystem based management –
- Long-term strategy – Lofoten – Barents Sea first step
- MAREANO – important program to fill in knowledge gaps on benthic ecosystems

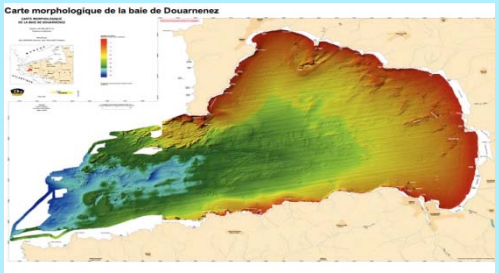
Courtesy of NGU, Norway

France

Mapping the coastal zone



- Basic maps : backscatter & bathymetry
- Value added maps :
  - Surficial sediments
  - Sediment thickness, geology
  - Benthic habitats (REBENT project)
- Multidisciplinary atlas



Courtesy of Ifremer, BRGM, France

Prospects at a European scale?

Key issues:

- Coverage
  - Geographical gaps
  - Varying density of data
- Quality
  - Age of the data
  - Often poor metadata standards
- Consistency
  - Differing data standards
  - Incompatible classifications, e.g. substrate types
- Accessibility
  - Often poor at national level
  - Not joined up at European scale, limited electronic access

Pilot projects 2009-2011

- Hydrography
- Geology
- Chemistry
- Biology
- Seabed habitats
- To collate fragmented and inaccessible marine data
- To convert to interoperable, continuous data for whole regions of Europe
- To make freely available with web delivery
- To support Marine Strategy Framework Directive and EU Maritime Policy

EUSeaMap
Broad-scale seabed habitat maps of European regions

www.jncc.gov.uk/EUSeaMap

JNCC
Joint Nature Conservation Committee

Ifremer

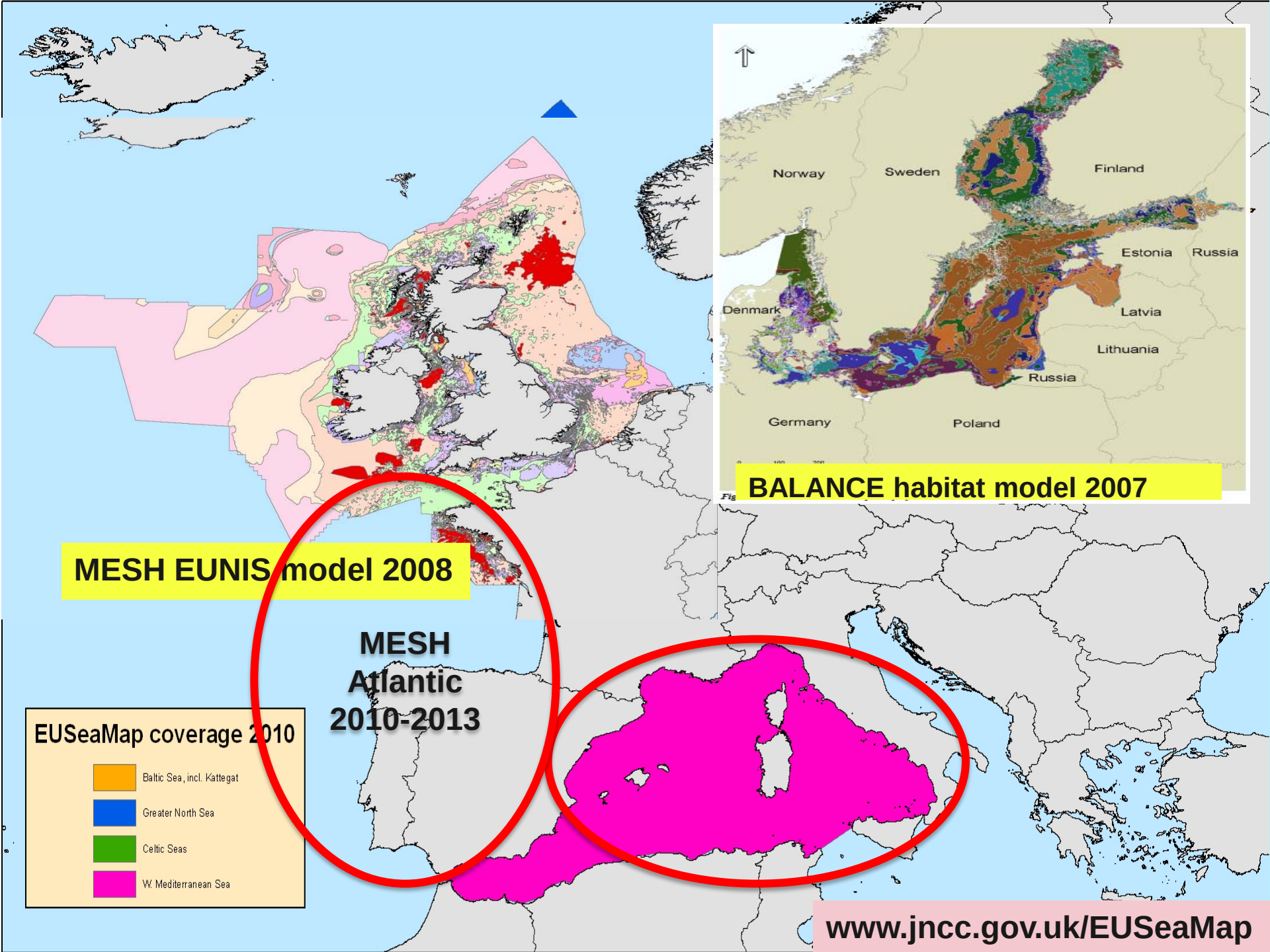
DANISH MINISTRY OF THE ENVIRONMENT
Agency for Spatial and Environmental Planning

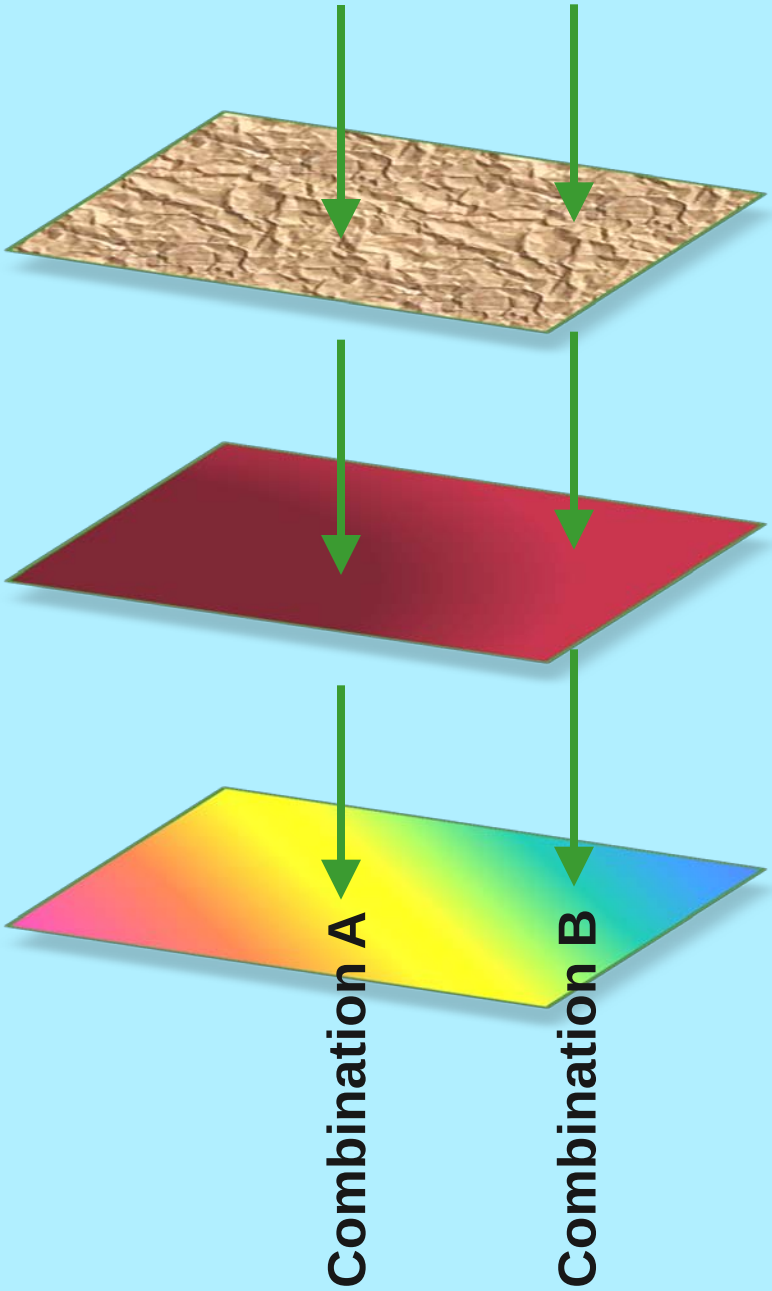
NATUR VÅRDS VERKET
SWEDISH ENVIRONMENTAL PROTECTION AGENCY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA 1914

ISPRA
Istituto Superiore per la Protezione e la Ricerca Ambientale

DHI


Norway
Sweden
Finland
Estonia
Russia
Denmark
Latvia
Lithuania
Russia
Germany
Poland
BALANCE habitat model 2007
MESH EUNIS model 2008
MESH Atlantic 2010-2013
EUSeaMap coverage 2010
Baltic Sea, incl. Kattegat
Greater North Sea
Celtic Seas
W. Mediterranean Sea
www.jncc.gov.uk/EUSeaMap



e.g.
Depth

e.g.
Seabed salinity

e.g.
Sediment type

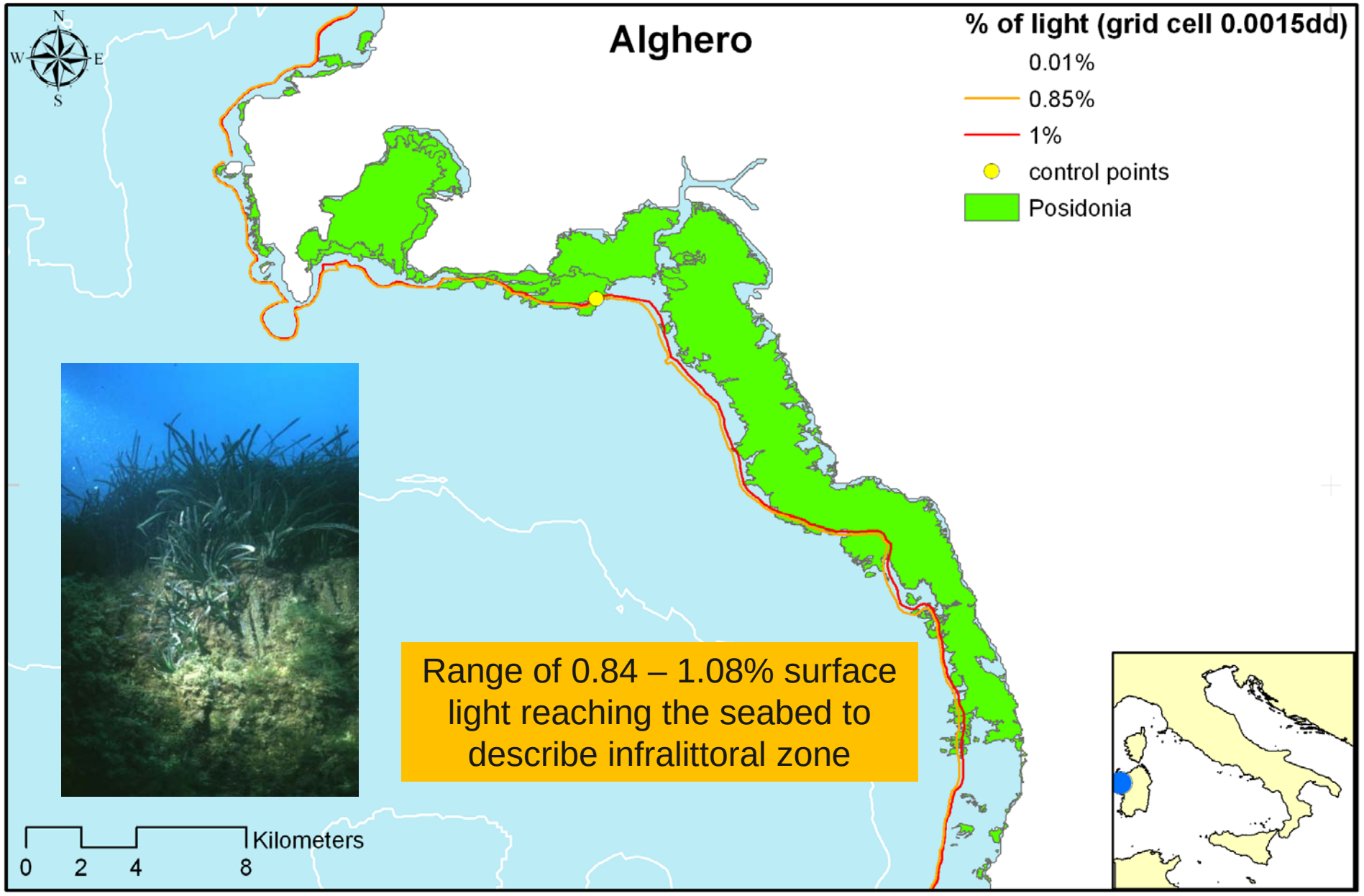
Biologically relevant?

Represented in EUNIS?

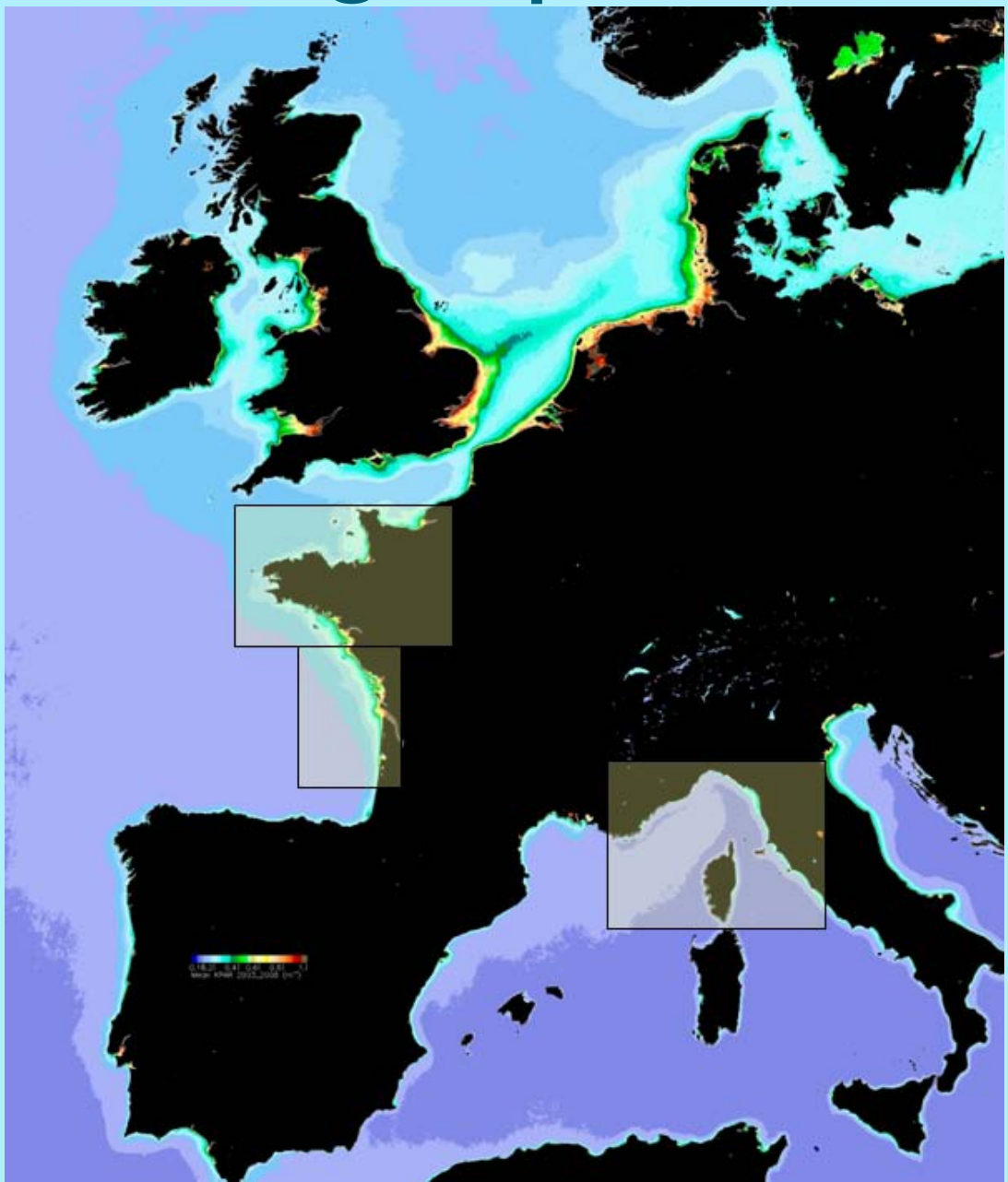
Other parameters:

- Energy at seabed (waves, currents)
- Light penetration
- Seabed temperature
- Oxygen levels
- Stratification

Lower limit of *Posidonia*



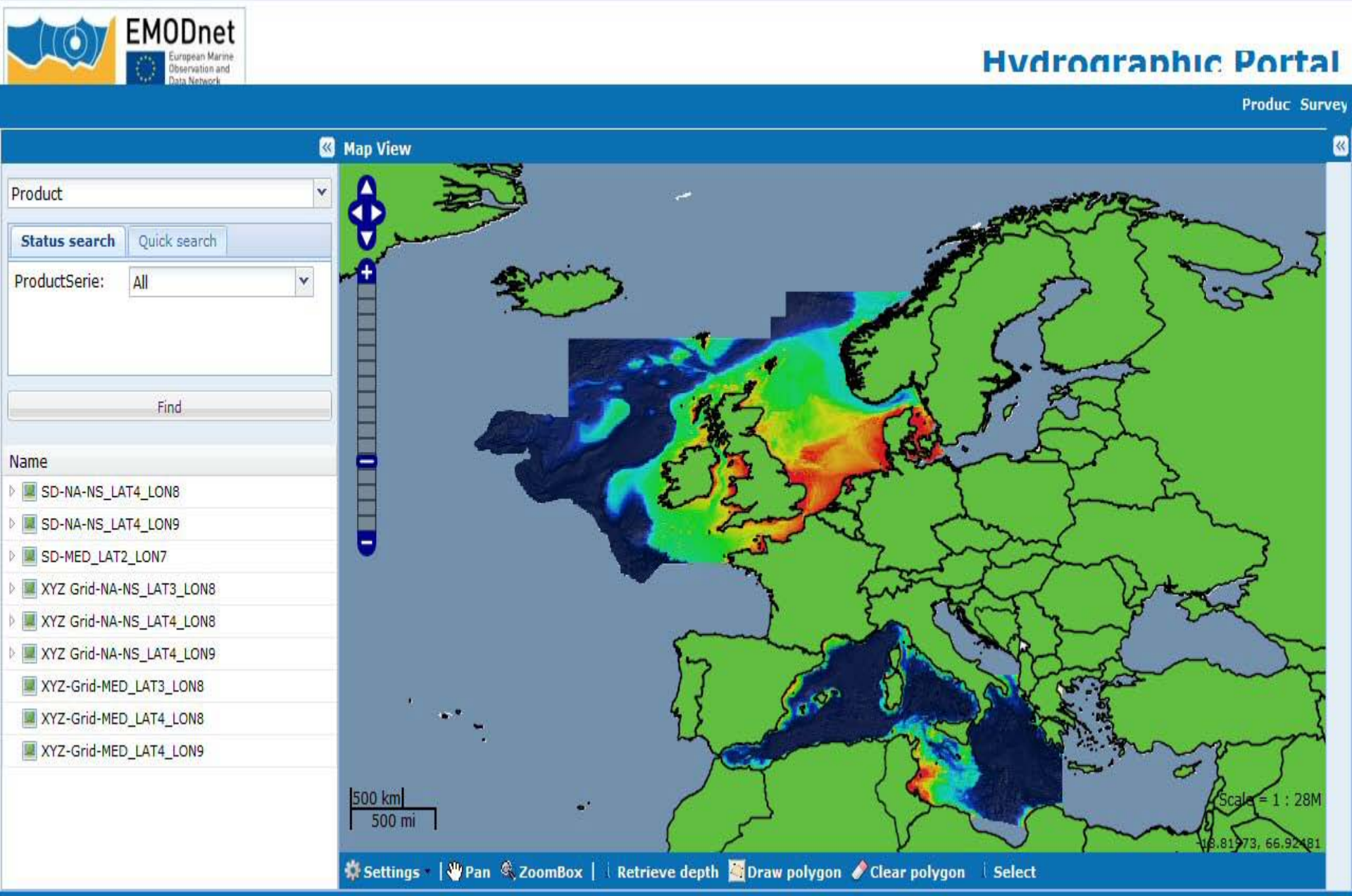
Light penetration data



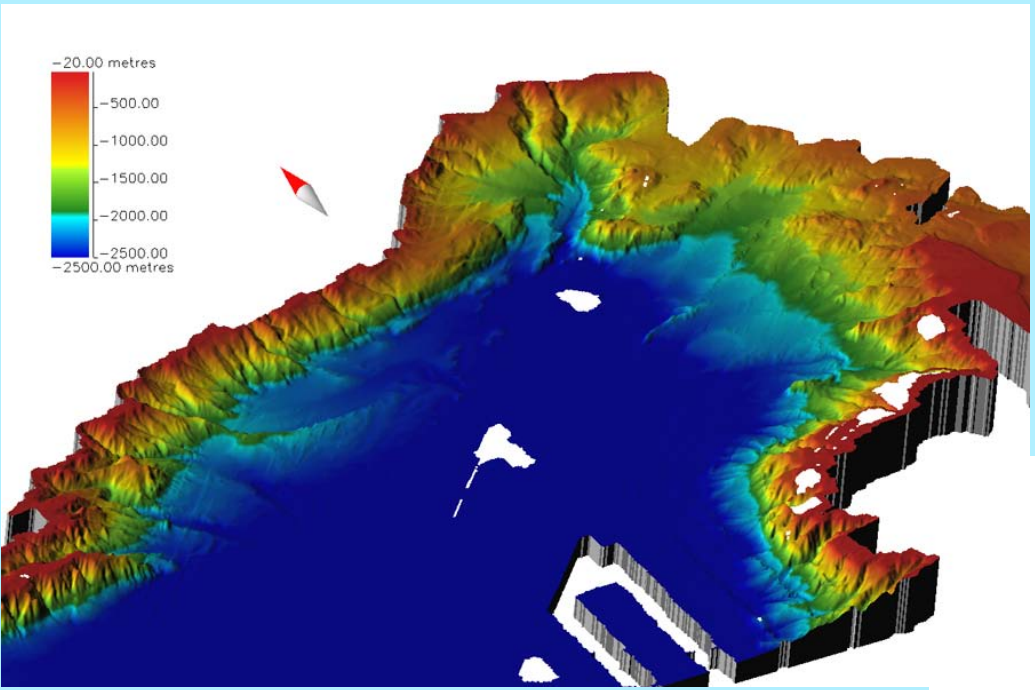
MERIS
satellite data

1km → 250m
resolution

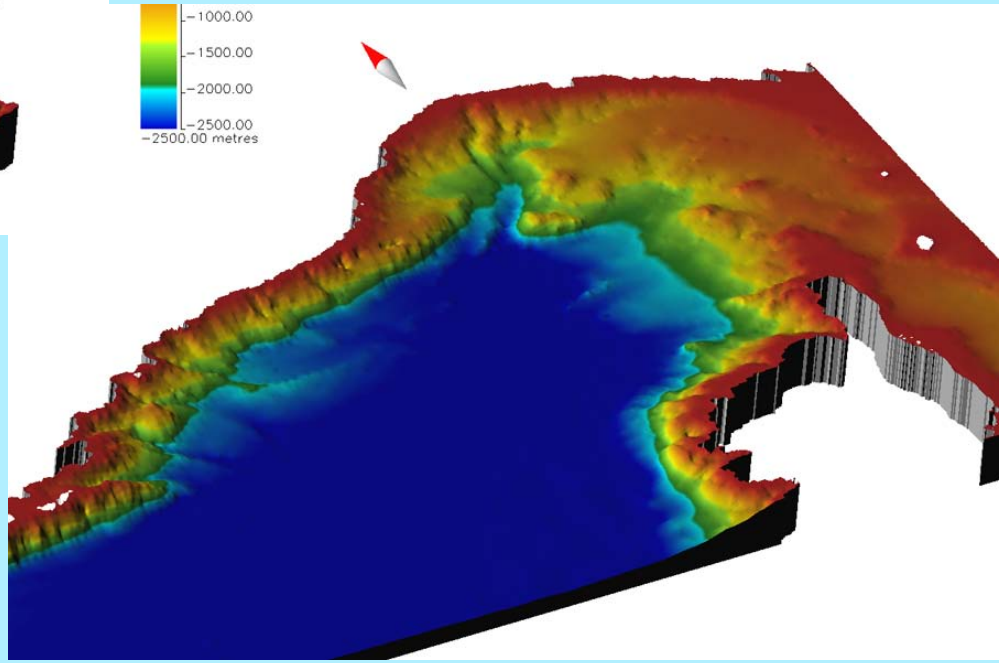
EMODnet bathymetry



EMODnet improving data resolution



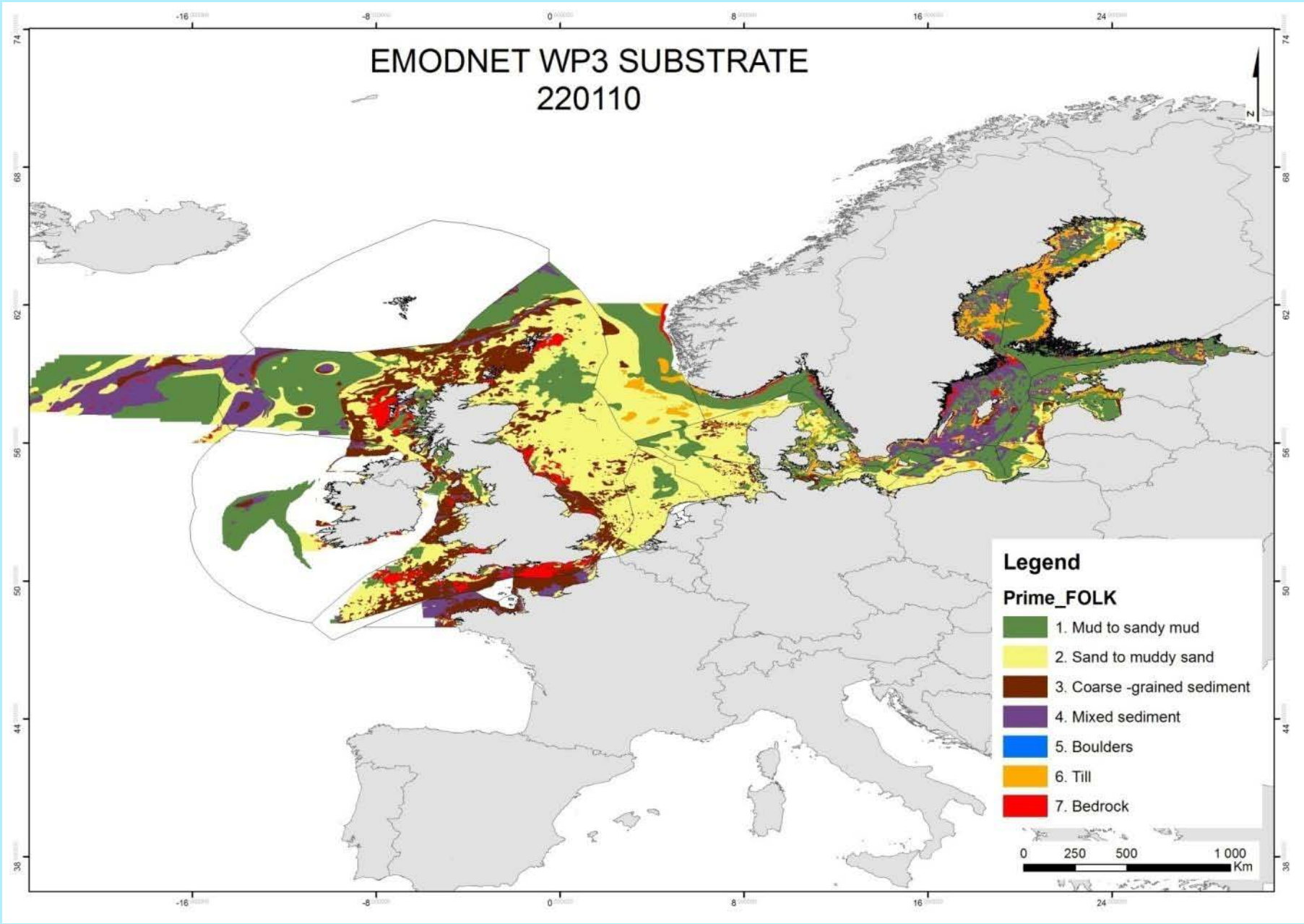
EMODNET

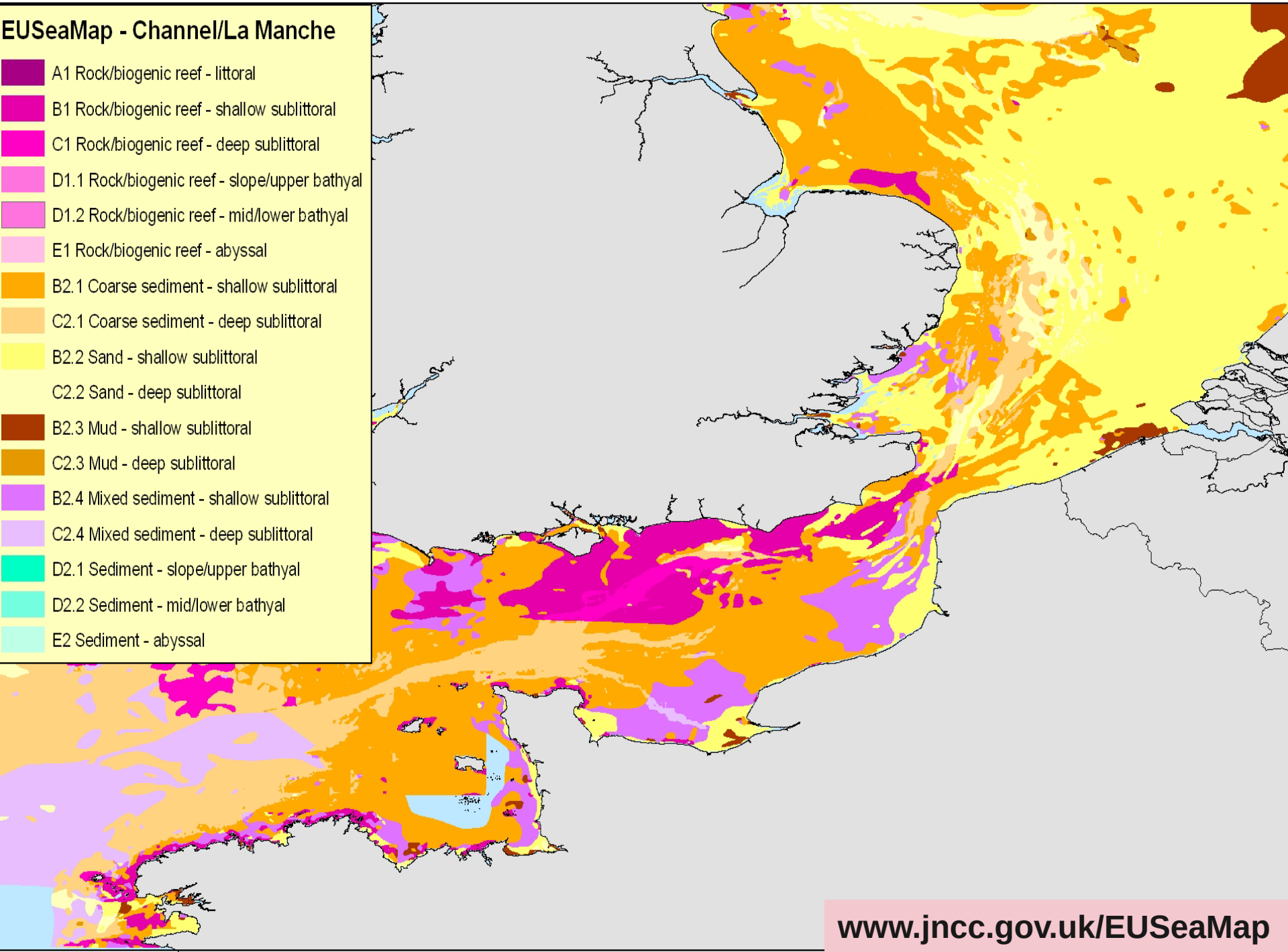


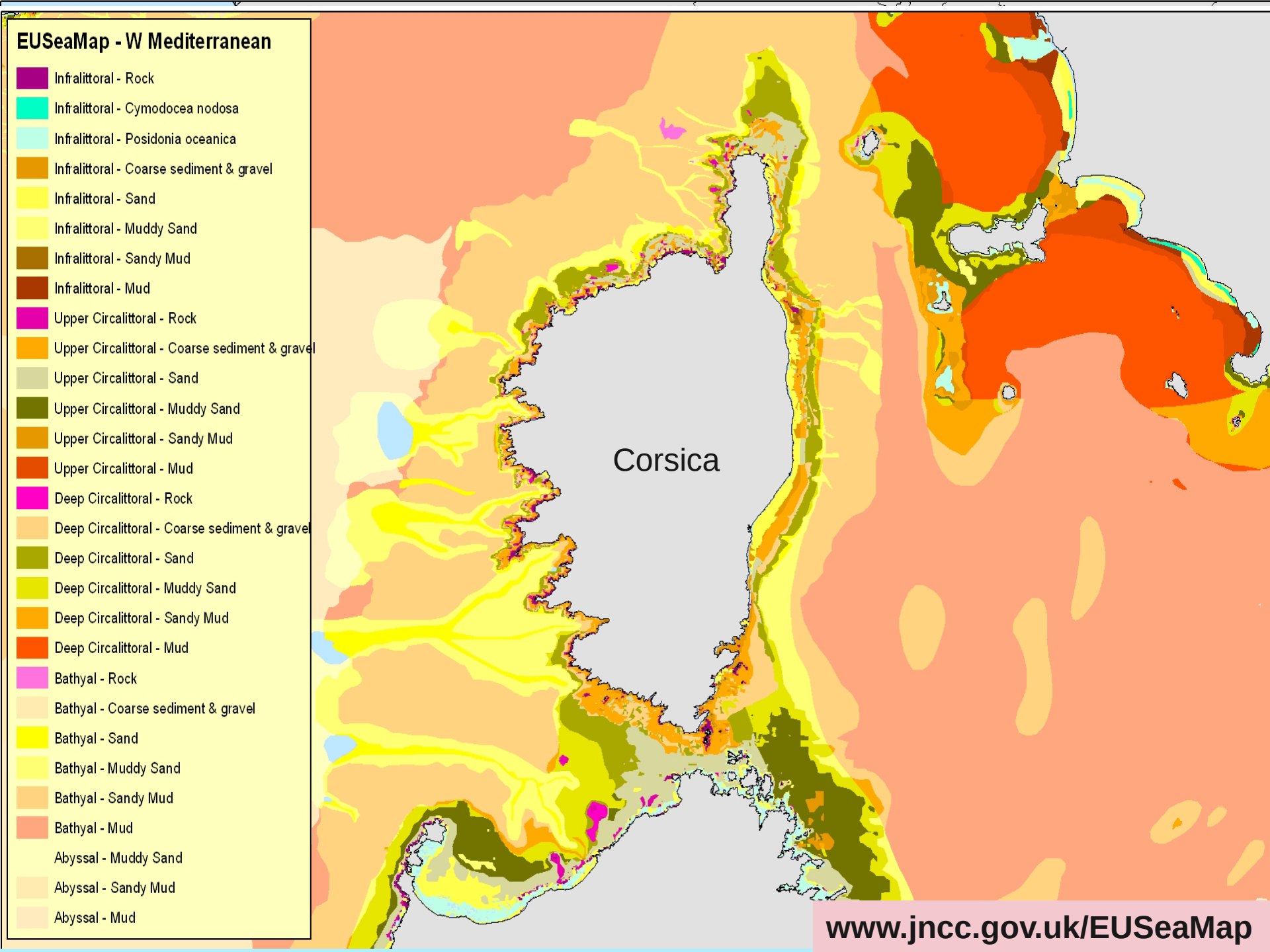
Comparison for Ligurian Sea

GEBCO

EMODnet substratum




EUSeaMap - Channel/La Manche
A1 Rock/biogenic reef - littoral
B1 Rock/biogenic reef - shallow sublittoral
C1 Rock/biogenic reef - deep sublittoral
D1.1 Rock/biogenic reef - slope/upper bathyal
D1.2 Rock/biogenic reef - mid/lower bathyal
E1 Rock/biogenic reef - abyssal
B2.1 Coarse sediment - shallow sublittoral
C2.1 Coarse sediment - deep sublittoral
B2.2 Sand - shallow sublittoral
C2.2 Sand - deep sublittoral
B2.3 Mud - shallow sublittoral
C2.3 Mud - deep sublittoral
B2.4 Mixed sediment - shallow sublittoral
C2.4 Mixed sediment - deep sublittoral
D2.1 Sediment - slope/upper bathyal
D2.2 Sediment - mid/lower bathyal
E2 Sediment - abyssal
www.jncc.gov.uk/EUSeaMap


EUSeaMap - W Mediterranean
Infralittoral - Rock
Infralittoral - Cymodocea nodosa
Infralittoral - Posidonia oceanica
Infralittoral - Coarse sediment & gravel
Infralittoral - Sand
Infralittoral - Muddy Sand
Infralittoral - Sandy Mud
Infralittoral - Mud
Upper Circalittoral - Rock
Upper Circalittoral - Coarse sediment & gravel
Upper Circalittoral - Sand
Upper Circalittoral - Muddy Sand
Upper Circalittoral - Sandy Mud
Upper Circalittoral - Mud
Deep Circalittoral - Rock
Deep Circalittoral - Coarse sediment & gravel
Deep Circalittoral - Sand
Deep Circalittoral - Muddy Sand
Deep Circalittoral - Sandy Mud
Deep Circalittoral - Mud
Bathyal - Rock
Bathyal - Coarse sediment & gravel
Bathyal - Sand
Bathyal - Muddy Sand
Bathyal - Sandy Mud
Bathyal - Mud
Abyssal - Muddy Sand
Abyssal - Sandy Mud
Abyssal - Mud
Corsica
www.jncc.gov.uk/EUSeaMap

Prospects for the future

- Broad-scale (modelling)
  - Bay of Biscay & Iberian Coast – within ~2 years (MESH Atlantic)
  - Gaps – rest of Mediterranean, Black Sea, Norway/Iceland
  - But these have limitations:
    - Input data quality and resolution
    - Understanding links to biological communities (habitat classification and thresholds)
    - Only suitable for national/regional applications
- Fine-scale (acoustic mapping with ground-truthing)
  - Growing effort, but many countries without national strategies
  - Decades to complete at current rates
  - Estimated €900m for multibeam alone
  - Economic and environmental demands are high

Achieving a seabed map of Europe

- This needs:
  - Investment in new survey – ‘invest to save’
    - for industry and environmental management
  - Improved standards
    - data collection and interpretation (www.searchMESH.net)
  - Greater understanding
    - relationships between biology and physical
  - Coordinated efforts
    - at European and national scales
    - European Centre for Seabed Mapping to promote and coordinate effort