Coastal mapping: surveys and products in Europe

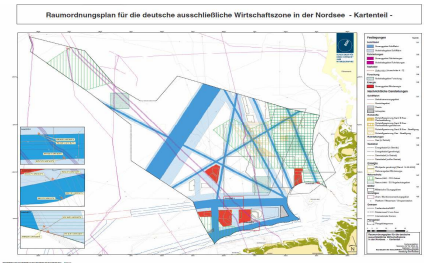
Needs for high resolution coastal mapping

Blue growth : Marine spatial planning

com(2013) 133, 12 March 2013

Needs for high resolution coastal mapping

Blue growth : Marine spatial planning



Needs for high resolution coastal mapping

Climate change : erosion

SWD (2013) 133, 16 April 2013,climate change in coastal regions

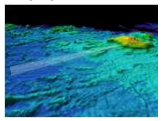
Needs for high resolution coastal mapping

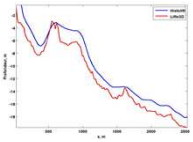
Climate change : marine submersion

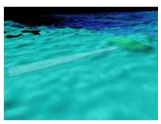
Needs for high resolution coastal mapping

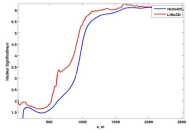
Climate change : marine submersion

Propagation of waves towards the coast highly depends on seafloor profile









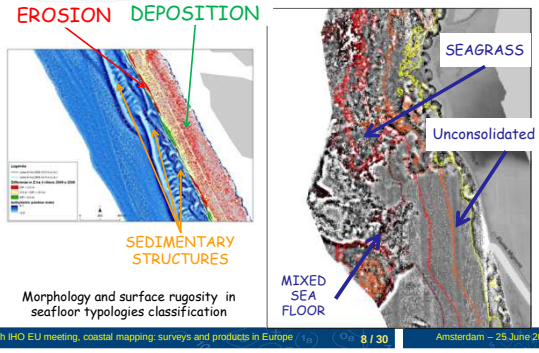
Experience gained and national programmes

Italy

Coastal Mapping using Bathymetric Lidar and Hyperspectral sensor in 100Km2 is not hampered by the (in) accessibility of a site, which is often a problem in coastal areas. Covering large surfaces in a short time in order to study vegetation patterns and morphology along coastal zones

The strategy of combining high and very high resolution spectral measurements in a multisensory and multi resolution analysis includes different way of data fusion to assimilate spectral and spatial variability in complex coastal mapping.

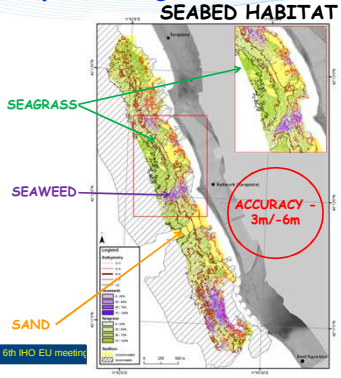
Experience gained and national programmes



Morphology and surface rugosity in seafloor typologies classification

Experience gained and national programmes

SEABED HABITAT MAPPING



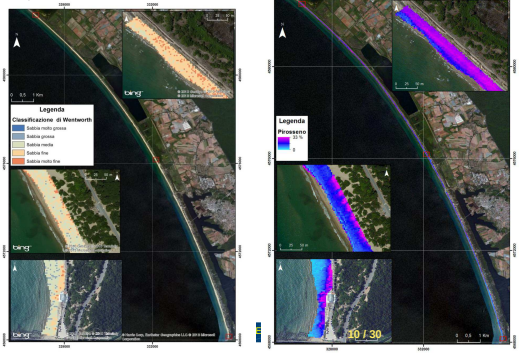
The sandy beach of S' Agostino represents the sandy southern edge of seagrass meadow. At lower bathymetries high cover percent of benthic seagrass and seaweeds are measured

SEAFLOOR PROPERTIES
Unconsolidated
Consolidated

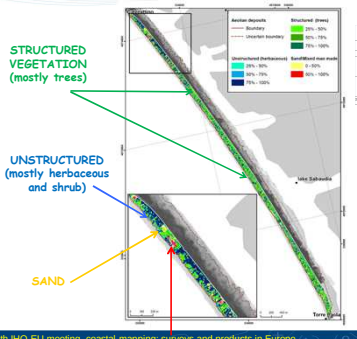
SEABED PROPERTIES
Seagrass
Seaweeds
Sands
Organogenic
Rocky

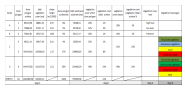
Experience gained and national programmes

MEAN Φ Run 07 PIROXEN Run 07



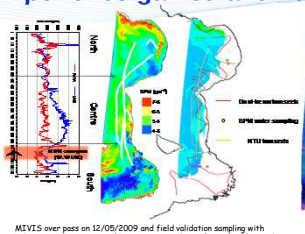
Experience gained and national programmes





'Structured vegetation', considering the extensive presence of Junipers and Pines overlay morphological complexity as well as the larger dimension and stability of dunes moving from north to south. 'Mixed substrates' and 'Sand and herbaceous' vary from pure sandy pixel to buildings, gardens, fences, private houses, pools...etc,

Experience gained and national programmes



MIVIS over pass on 12/05/2009 and field validation sampling with turbidimeter measurements of TSM, Image analysis of water quality with BOMBER (Giardino et al., 2012)

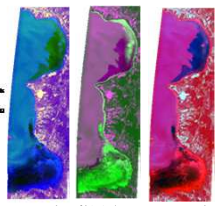
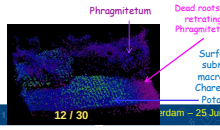


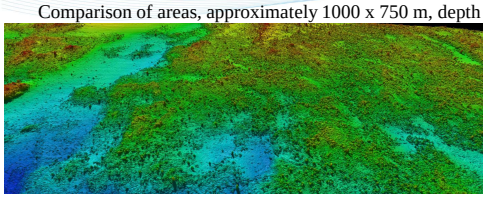
Image analysis of lake bed properties wit Spectral Mixture Models

SMA results combined with LiDAR classification on the base of reflectance and depth values provides a 3D view of lake bed that validated and refined hyperspectral mixture models of macrophytes and reeds.



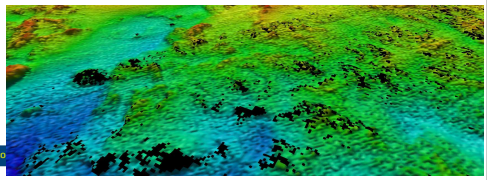
Previous experience in Sweden

Comparison of areas, approximately 1000 x 750 m, depth 2,5 - 11 m

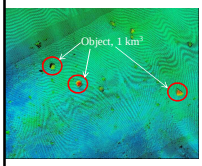


Multibeam, 1x1 m grid. Plenty of stones in the area.

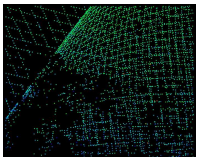
LIDAR (Hawkeye II), 5x5 m grid. In general the same image of the seafloor. However no stones/objects. Some gaps where the LIDAR system couldn't survet the seafloor.



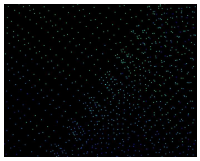
Comparison of point density an area of 40 x 40m, 4 – 5 m depth



Multibeam, view from above

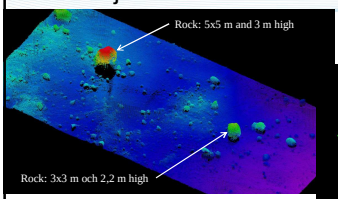


LIDAR (Chiroptera)

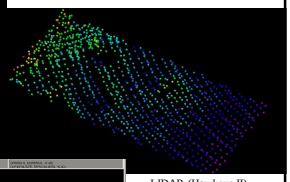


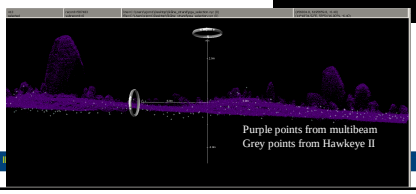
LIDAR (Hawkeye II)

Object detection LIDAR vs Multibeam



Multibeam
Mean depth: ca 6 m
Shallowest point: 2,75 m





LIDAR (Hawkeye II)
Could not find any of the rocks found with the multibeam system.

Experience gained and national programmes

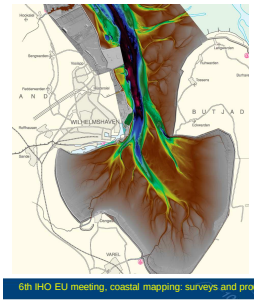
Norway

The Norwegian coast: 100 915 km, including 239 057 islands

- ***Continuous surveying programme for the coastal zone***
  Equipment: multibeam on 3 launches
- ***A national multi diciplinary survey programme in preparation***
- ***Utilized LIDAR several times in the period 1998-2006***
- ***Running a LIDAR pilot project for high resolution integrated (sea and land) coastal zone surveying***

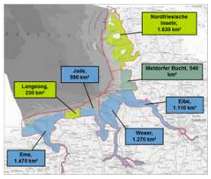
Experience gained and national programmes

Germany



Integrated high resolution DTM (1m-Grid)

- Multi-sensor-survey
- combined terrestrian and seaground model
- Purposes:
  - coastal protection
  - Environment monitoring
  - Habour construction



Experience gained and national programmes

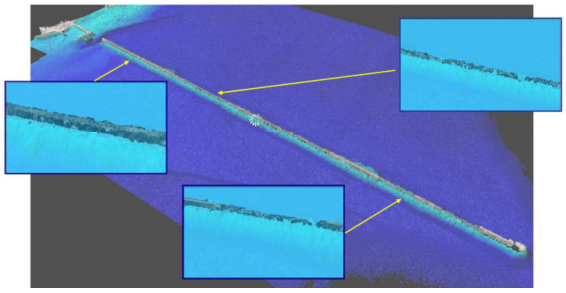
France

Parties terrestres et maritimes produites ou programmées

Partie terrestre produite ou programmée

Experience gained and national programmes

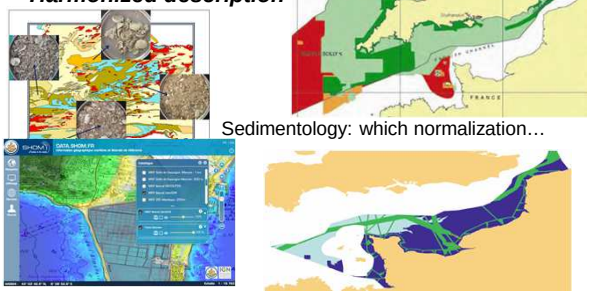
Gestion des infrastructures portuaires (Toulon)



Experience gained and national programmes

Benefits of a joint programme

Harmonized description

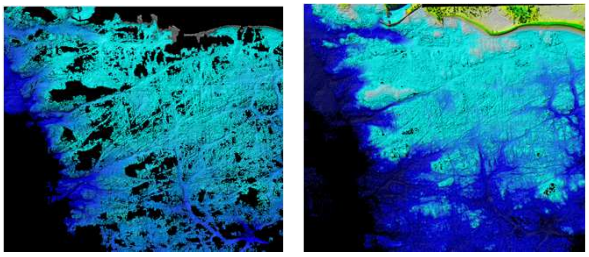


Sedimentology: which normalization…

Bathymetry& & elevation: which resolution,which vert ref

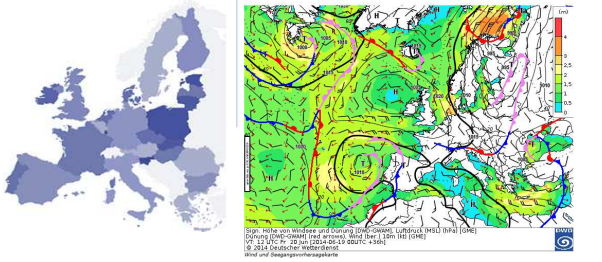
Benefits of a joint programme

Share the experience and the know-how



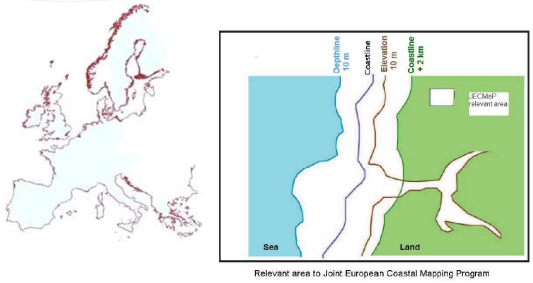
Benefits of a joint programme

Share the collection of data (devices, processing tools…)



Design study

Geographic extension



Relevant area to Joint European Coastal Mapping Program

Deliverable: map of the relevant area

Design study

Areas at stake

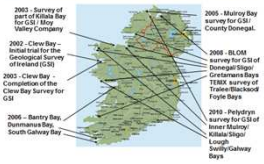



Deliverable: map of the sensitive areas

Design study

Sharing gained experiences





Deliverable: feedback of experiences

Design study

Surevey strategy




Satellite bathymetry

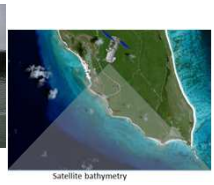
Taking into account various types of surveys, MBES, Lidar, SDB
And their performances, depending on
-water turbidity, sea states, weather conditions…

Deliverable: surveying scheme

Design study

Product specification



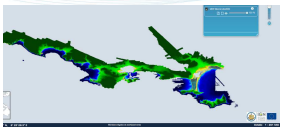

Satellite bathymetry

Taking into account various types of surveys, MBES, Lidar, SDB
And their performances

Deliverable: product specification

Design study

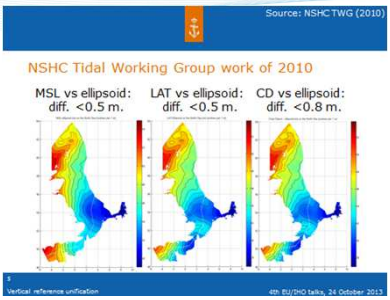
Preexisting data & products



Deliverable: map of the compliant existing data

Design study

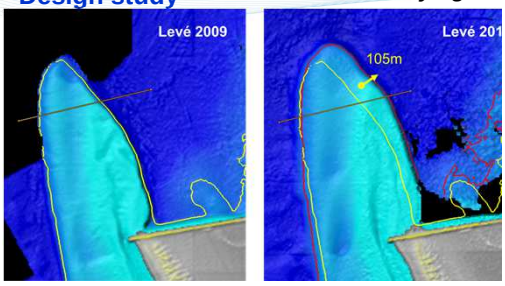
Common vertical reference



Deliverable: evaluation of cost and time for establishing a common vertical reference surface

Design study

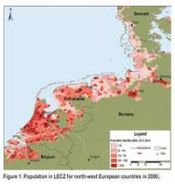
Resurveying strategy

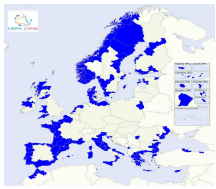


Deliverable: resurvey strategy, depending on sedimentology, waves and streams.

Design study

Implementation policy





Take into account
-prerogatives of Member States (prioritiy areas) & funding
-funding by
European regional development fund, EMFF, « climate change funds »…?

Deliverable: description of a scheme of governance

Design study

Overall result

To be able to
Specify a programme on an appropriate area
Covering several Member States coastline
To be carried out in a sensible time scale
At a cost to be sensibely estimated
Gathering funding by Member States and European funds
Delivering harmonized products

Design study

Time scale

Specification of design study : September 2014
Proposal by HOs November 2014
To begin January 2015
To be lasting 18 months

Thank you for your attention