MICORE

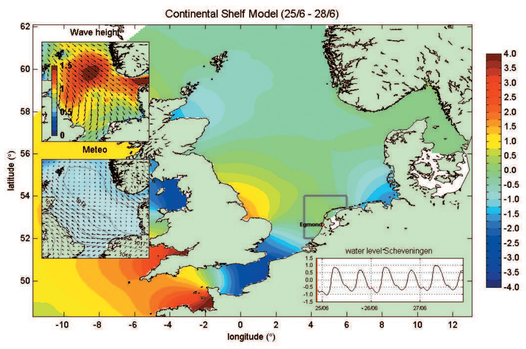
Morphological Impacts and COastal Risks induced by Extreme Storm events

www.micore.eu

1 The Project

The MICORE project will provide the knowledge necessary to assess the present day risks and to study the economic and social impact of future severe storm events. The project will also develop operational predictive tools in support of emergency response to storm events. Together, these elements will have an important strategic impact on the safety of the people living in coastal areas. The project will also investigate with stakeholders and end-users the possibilities of producing EU-wide guidelines for a viable and reliable risk mitigation strategy.

MICORE will produce an up-to-date data base for each partner country that will include: an historical review of storms; an inventory of data related to the forcing signals; quantification of the morphological response of coastal systems to storms and to sequences of storms; an assessment of socio-economic impact; a description of existing civil protection schemes and interventions



2 The Specific Objectives

The specific objectives of the MICORE project are:

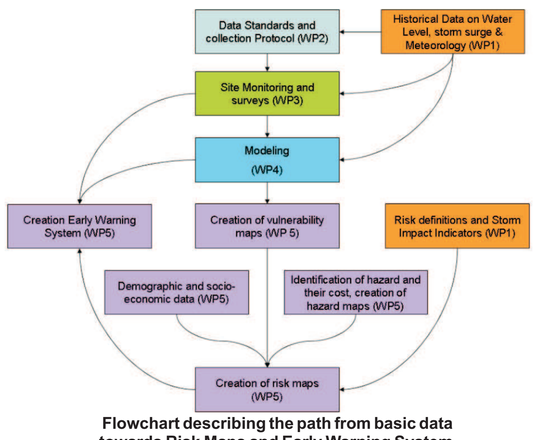
1. To undertake a review of historical marine storms that had a significant impact on a representative number of sensitive European regional coastlines. The diverse range of coastal regions of the European Union is selected according to wave exposure, tidal regime and socio-economical pressures. They include outmost regions of the European Union at the border with surrounding states (e.g. the area of the Gibraltar Strait, the Baltic and Black Sea), as well as coastlines bordering open ocean and semi-enclosed shelf seas.
2. To collate data related to occurrence of significative extreme events and socio-economic impacts in a database. Parameters will include:
   - characteristics of the storms: wind and wave measurements, wave hindcasts, tide measurements, surge computations;
   - morphological impacts including pre- and post-storm beach profiles, presence of dune overwashing/overtopping, damage to coastal structures;
   - socio-economic impact including cost of reconstruction, loss of lives and property, dune reconstruction and beach replenishment;
   - civil protection schemes, implementation of warning systems and preparation of hazard and vulnerability maps;
   - competent authorities and statutory bodies and voluntary organisations for warnings
3. To undertake monitoring of nine European case study sites for a period of 1 year with the following aims:
   - to collect new data sets of bathymetry and topography using state-of-the-art technology (Lidar, ARGUS,

4. To test and develop reliable methods for numerical modelling of storm-induced morphological changes for the following purposes:
   - to test the predictive capability of wave and surge hindcast models routinely used by end users in each region of interest;
   - to link morphological models with wave hindcast models;
   - to evaluate the accuracy of off-the-shelf morphological models for prediction of extreme erosion hot-spots;
   - to test and develop a new open-source morphological model for the prediction of storm impacts.
5. To set-up real-time warning systems and to implement their use within Civil Protection agencies with the aim of:
   - linking morphological models with wave hindcast models;
   - preparing early warning protocols;
   - developing an expert system in support of long-term disaster reduction including timely disaster relief operations.
6. To disseminate results to end users at national, European and International levels through:
   - a series of non-technical workshops;
   - production of a multilanguage report;

3 Workpackages

WP 1 Historical storms

The main objective is to review the state-of-the-art for each site, producing an historical review of storms, collecting all data such as the forcing signals (wind, waves, water levels), the morphological response, the socio-economic impact and the civil protection schemes of interventions and other mitigation measures (e.g. relocation of people and activities).



Flowchart describing the path from basic data towards Risk Maps and Early Warning System

WP 2 Data standards

The objective of this workpackage is to take-in, store, process and disseminate physical data for each pilot site (bathymetries, waves, tides etc.) in a form convenient for the assessment of storm risk along the European coastlines. To promote in- and external cooperation MICORE adopts the approaches and standards proposed by OpenEarth the open source initiative for working with data, models and tools. (Http://openearth.deltares.nl)

WP 3 Site monitoring

Intensive monitoring of critical stretches of coastline at each site is taking place, according to the identification of risk priorities identified from the study of past events. In addition to the measurement of physical parameters during the storms (e.g. waves, tides, beach profiles), surveys are undertaken to identify points of damage to structures or dune breaching. Waves and tides are measured using existing networks of gauges and/or new stations specifically installed for the project. An important aspect is the use of real-time wave and tide datasets, for the planning of surveys immediately after the high energy events. Morphologies are studied using

WP 4 Modelling

A major aim is to test where new and off-the-shelf models are able to predict coastal changes after major storms. A new model (X-beach) will be used to predict coastal changes generated by high energy events. The model will be a useful mean for European countries to produce predictions of storm impacts on beaches considering all the information available. The new model will be relevant to many different conditions observed along European coastlines, so that it will be suitable for countries facing the Atlantic Ocean as well as for countries facing the Mediterranean Sea or the Black Sea. A Morphological Impact Threshold will be defined to know which are and will be the hydrodynamic and morphological conditions that lead to a coastal disaster or to damage to coastal

WP 5 Warning system development

The MICORE Consortium will produce early warning protocols that will include all the variables relating to coastal risk as it is defined in WP1, data archiving protocols defined in WP2 and model predictions from WP4. End-users will be strongly involved in this part of the project. The main output of the project will be site-specific operational warning systems to be used for Civil Protection purposes. An additional output will be risk maps that could be used by public authorities as well as private stakeholders for strategic planning and mitigation purposes.

WP 6 Dissemination and exploitation

All stakeholders at regional and national level will participate to local meetings. A multi-language report will be produced. The dissemination will also include workshops for end-users to illustrate the definition of risk for each site and the critical areas. Moreover, the new warning system will be presented together with a training session to tell end-users how to use the outputs. A web site with a Web-GIS will be produced in order to upload on the Internet the Project outputs such as risk maps, descriptions of areas at risk and available datasets.

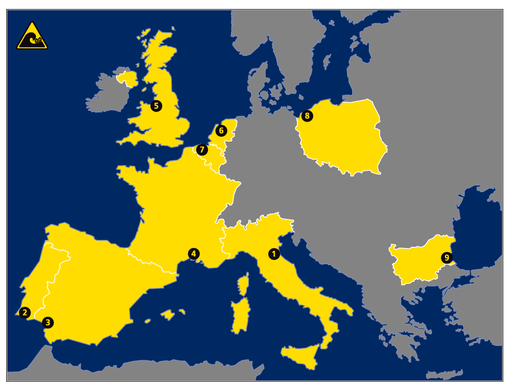
WP 7 Project management

WP7 consists in the management activities of the project and the general administration of financial issues within the project. This task is performed by combining Scientific Leadership by the Coordinator (University of Ferrara) with Quality Assured management procedures by partner Consorzio Ferrara Ricerche.

Country	Italy	Portugal	Spain	France	UK	NL	Belgium	Poland	Bulgaria
Partner	UniFe	UALG FFCUL	UCA UPO	BRGM	UoP POL	TUD WLD	IMDC	USZ	IO-BAS
Beach related damages									
Shoreline	X	X	X	X	X	X	X	X	X
Dune	X	X	X	X	X	X	X	X	X
River mouth, inlet	X	X	X		X			X	X
Salt marsh		X	X						
Barrier island		X		X	X			X	
Tidal flat, mud flat		X			X				
Non-beach related damages	Evaluation of damages trough comparison between pre- and post-storms aerial/satellite photographs; mapping of damages with portable GIS (position of infrastructures harmed or destroyed by marine storms, relevance and range of damages); Questionnaires to people living and working along the coastline; collection of cadastral information								
Touristic infrastructures	X	X	X	X	X	X	X	X	X
Industrial activities					X			X	
Port					X		X		
Private properties	X	X	X	X	X	X	X	X	X
Roads	X	X	X	X	X	X	X	X	X
Railway				X					
Villages	X	X	X	X	X	X	X	X	X
Touristic value	X	X	X	X	X	X	X	X	X
Coastal protections	X		X	X	X	X	X	X	

Details of damages likely to be observed at each case study site

4 The Case Studies



1	Italy	Lido di Dante Lido di Classe	Natural with dunes, river mouths - defended coastline, infrastructures, high touristic value, microtidal	8 km
2	Portugal	Praia de Faro	Barrier-islands, dunes, overwashes, inlets, high touristic value, infrastructures, mesotidal	8 km
3	Spain	La Victoria Camposoto Beach	Urban beach, high touristic value, defended coastline, infrastructures - natural sand spit with dunes, overwashes, river mouth, salt marsh, touristic value, mesotidal	10 km
4	France	Lido of Sète to Marseillan	Low barrier island, dunes, high touristic value, defended coastline, infrastructures, microtidal	13 km
5	United Kingdom	Eastern Irish Sea	Macrotidal site with high occupation and touristic value, high value infrastructure, coastal defences, sand dunes, tidal flats, mud flats, salt marsh and estuaries	40 km
6	The Netherlands	Egmond	Nourished beach, dunes, high touristic value, mesotidal	5 km
7	Belgium	Mariakerke	Wide dissipative urban beach regularly nourished, infrastructures, defended coastline, high touristic value, macrotidal	11 km
8	Poland	Dziwnow Spit	Sand spit with low dunes; river mouth, protected coastline, nourishments to protect infrastructures, high touristic value, non-tidal	15 km
9	Bulgaria	Kamchia Shkorpilovtsi	Open beach on the Black Sea, dunes, river mouths, touristic value, non-tidal	13 km

5 Partners

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