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Cooperation Programme INTERREG V-A Italy - Malta

Stakeholders Meeting in Malta

MONITORING OUR CLIFF ENVIRONMENTS

The "NEWS" Project

Nearshore hazard monitoring and Early Warning System

Francesco Castelli

Faculty of Engineering and Architecture - University of Enna "Kore"

The Palace Hotel, Sliema, Malta, 29th November 2019

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Priority Axis 3 : Protecting the environment and fostering an efficient use of resources

Investment Priority 5b :
Creation of systems of management of natural disasters designed to increase the resilience of the population

Specific Objective 3.2 :
Mitigation of the effects of the climate changes

The "NEWS" Project

Nearshore hazard monitoring and Early Warning System

University of Enna "Kore"

University of Malta

University of Catania

Libero Consorzio Comunale di Ragusa

TOPIC

The southern coast of Sicily (Italy) and the islands of Malta's archipelagos are highly exposed to risks coming from the sea.

These coasts are subjected to fast erosion phenomena due to natural causes, which involve failure of cliffs, triggering of localized erosions and the possibility of flooding.

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AIM OF THE PROJECT

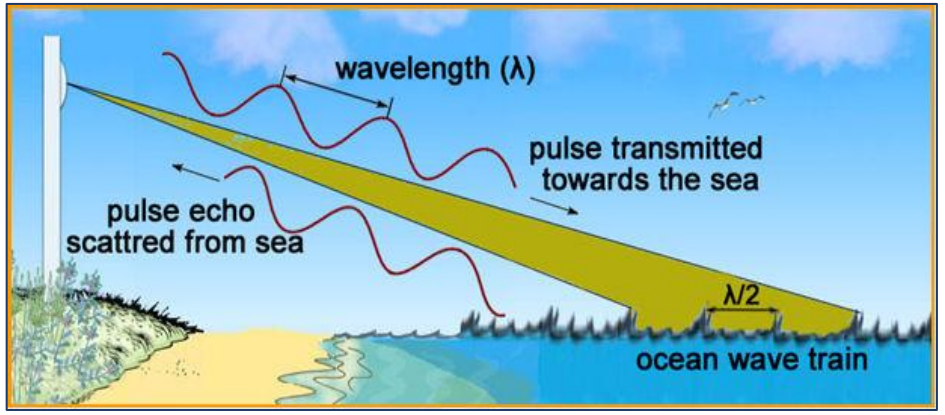
Project NEWS ➡ In this project coastal risk processes will be modeled and monitored and an alert system will be also designed.

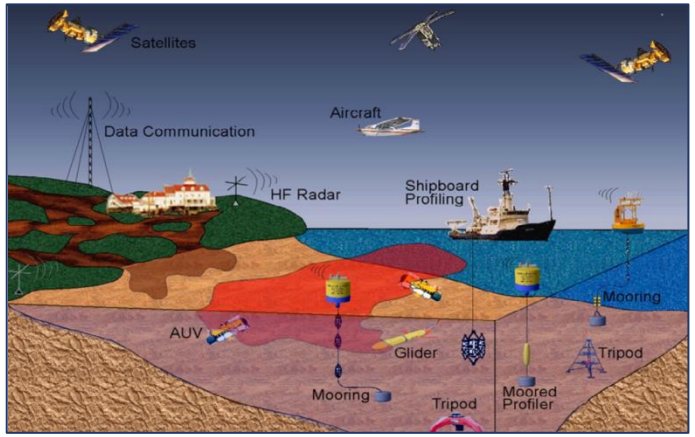
The system will make use of an integrated geophysical sensor network on land, as well as, a networked set of wave buoys installed offshore Sicily and Maltese Islands.

AIM OF THE PROJECT

The project aims to implement a strategy, common to the two Countries, which includes:

- *Monitoring systems on land and offshore;*
- *Proposal of specific actions aimed to prevent the risks coming from the sea;*
- *Creation of a systems designed to increase the resilience of the population against these natural disasters.*





STRUCTURE OF THE PROJECT

- *1) Development of an integrated monitoring and early warning system to prevent the risks coming from the sea;*
- *2) Test sites located both in the Sicily Channel and Maltese Islands;*
- *3) Development of actions that directly improve the resilience of populations by the dissemination of results (info-days, conferences, etc.);*
- *4) Practical trainings that directly involve the local population and the distribution of an "app" among the "sea users".*

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STRUCTURE OF THE PROJECT

STRUCTURE OF THE PROJECT

- ***WP1*** *Management of the Project*
- ***WP2*** *Communication Activities*
- ***WP3*** *Development of a model for assessing the short-term foreshore wave effects*
- ***WP4*** *Coastal risk monitoring network*
- ***WP5*** *Early warning system for the Sicilian and Maltese Island coasts*

WP1
WP2
WP3
WP4
WP5

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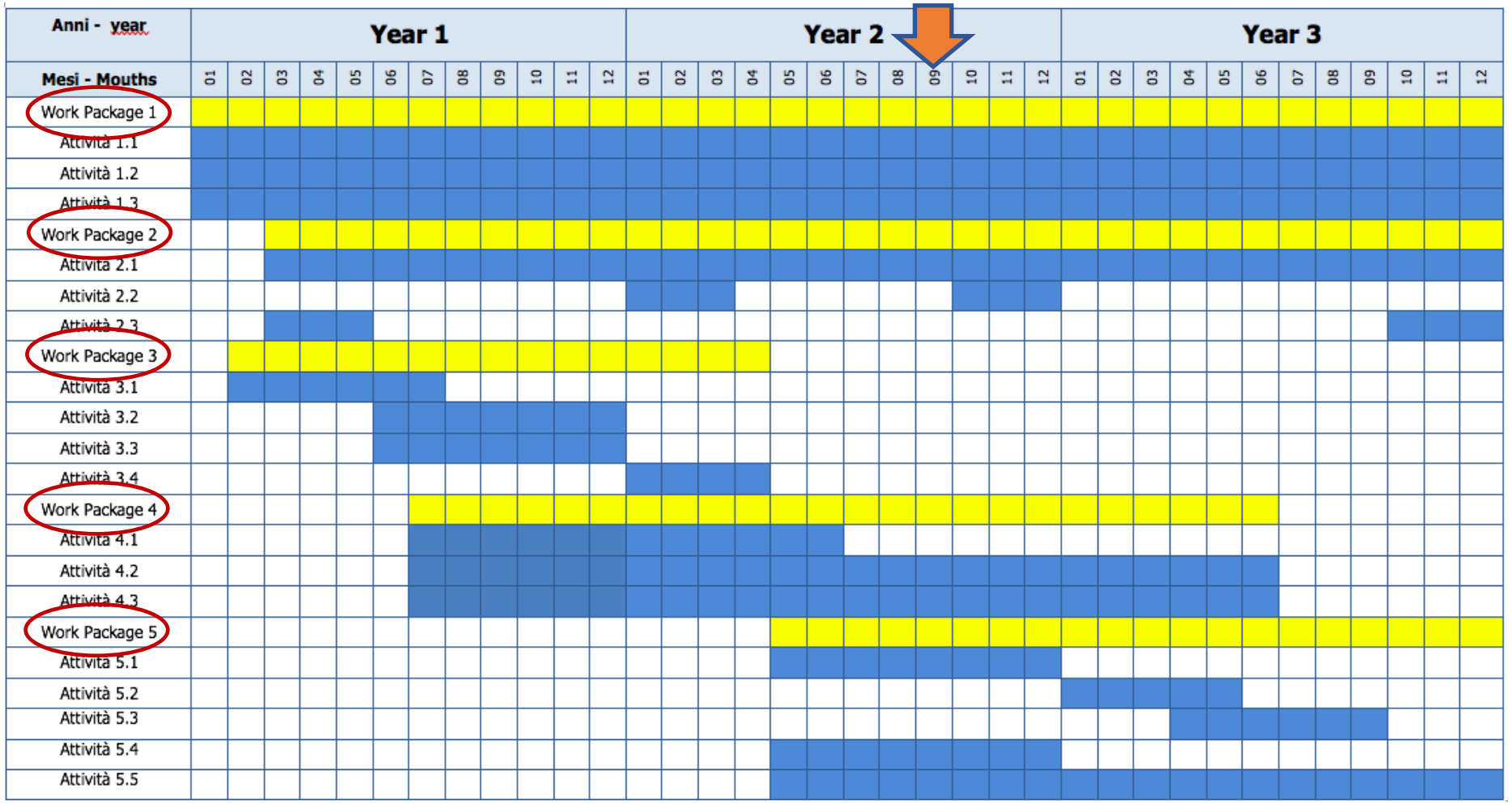
TIME TABLE OF THE PROJECT



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DEVELOPMENT OF A MODEL FOR THE EVALUATION OF NEARSHORE WAVE EFFECTS

OutPut - Deliverables

- ***Risk Scenarios***
- ***Development of a model for assessing the short-term foreshore wave effects***
- ***Development of a model for evaluating the wave effects on cliffs***
- ***Development of a neural network for the prediction of the short-term foreshore wave effects***

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Deliverable 3.2.1

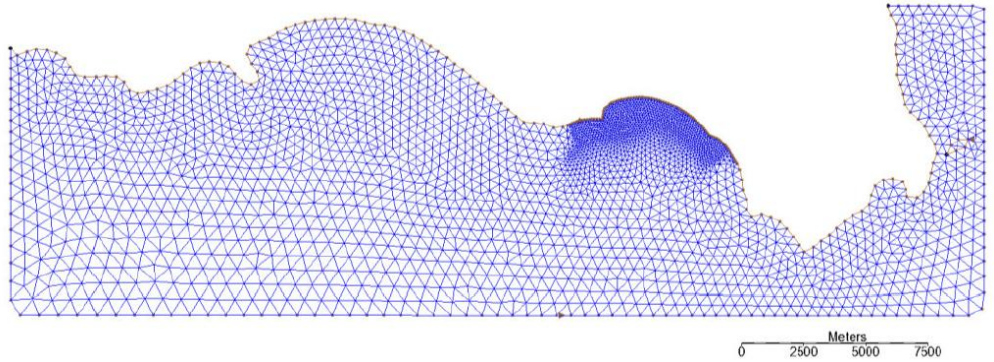
OUTLINE O THE PROJECT

***WP3** Development of a model for the evaluation of near-shore wave effects*

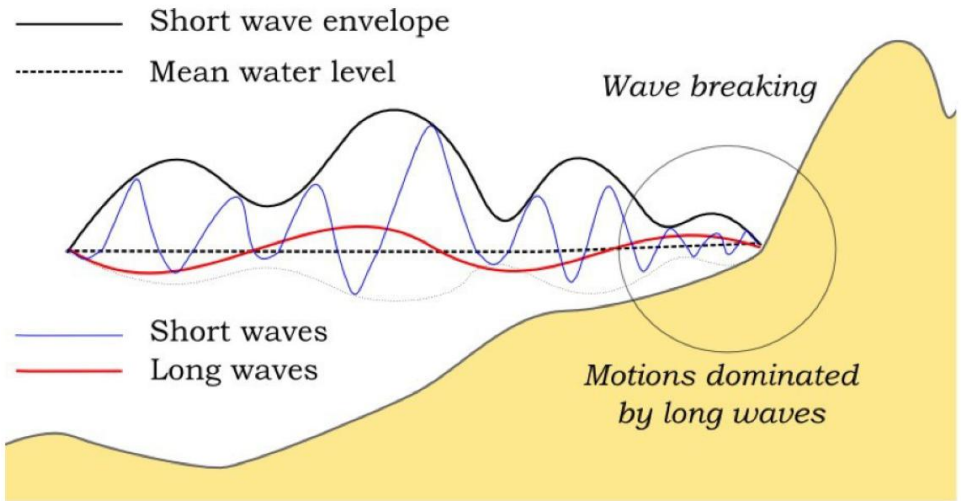
WORK PACKAGE GOAL

Use of numerical models able to reproduce:

- ***The wave propagation in the near-shore zone***
- ***The wave effects on coasts***



Example of numerical domain with unstructurated cells



Main wave processes in the near-shore zone

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Deliverable 3.3.1

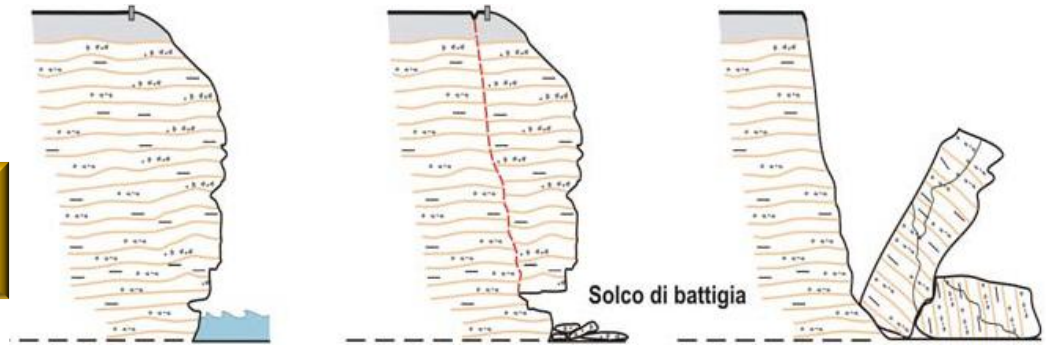
OUTLINE O THE PROJECT

***WP3** Development of a model for evaluating the wave effects on cliffs*

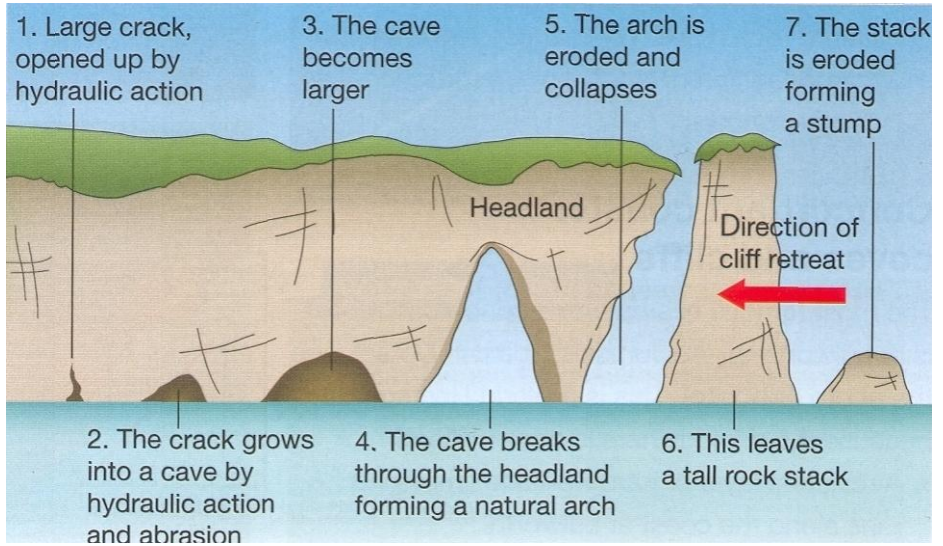
WORK PACKAGE GOAL

Use of numerical models able to reproduce:

- ***The transmission mechanisms of energy by correlating the dynamic parameters of the input (waves) to the dynamic parameters of the cliff***



Examples of cliff instability



Examples of cliff erosion

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Deliverable 3.3.1

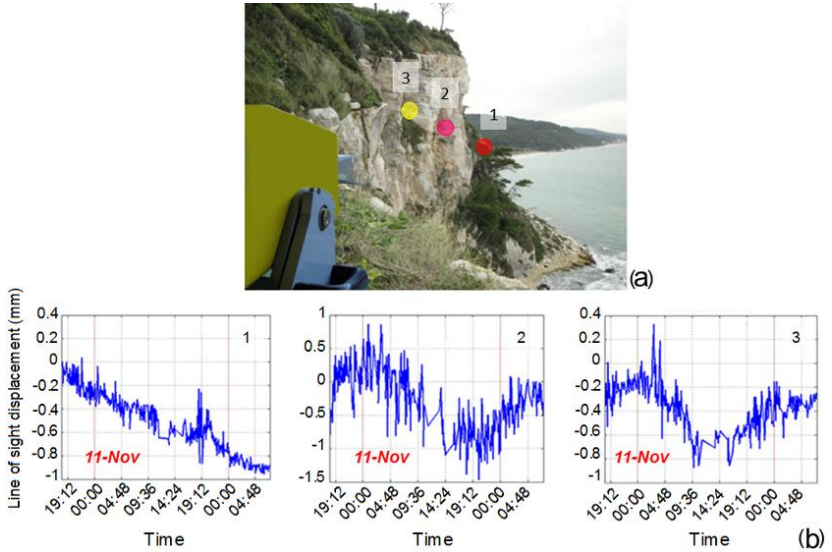
OUTLINE O THE PROJECT

***WP3** Development of a model for evaluating the wave effects on cliffs*

WORK PACKAGE GOAL

- ***Waves impacting on cliffs generate fractures of rock favoring the detachment of debris and blocks***
- ***Wave motion effects favor the continuous fall of blocks causing a progressive cliff retreats***

Wave motion effects on cliff

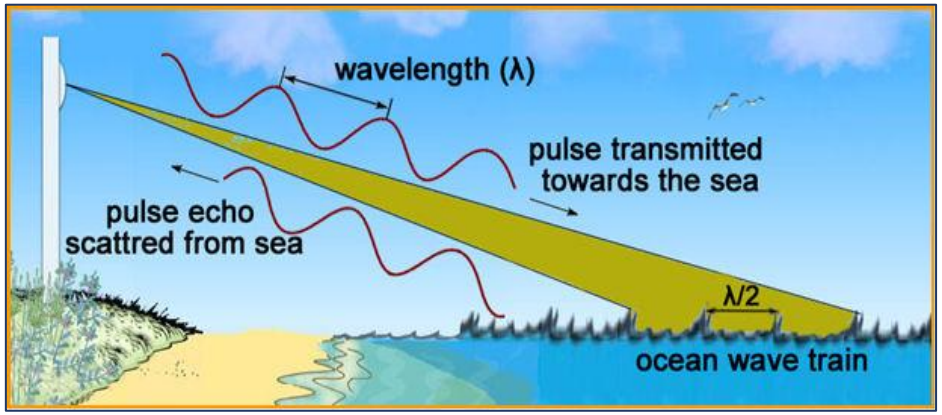


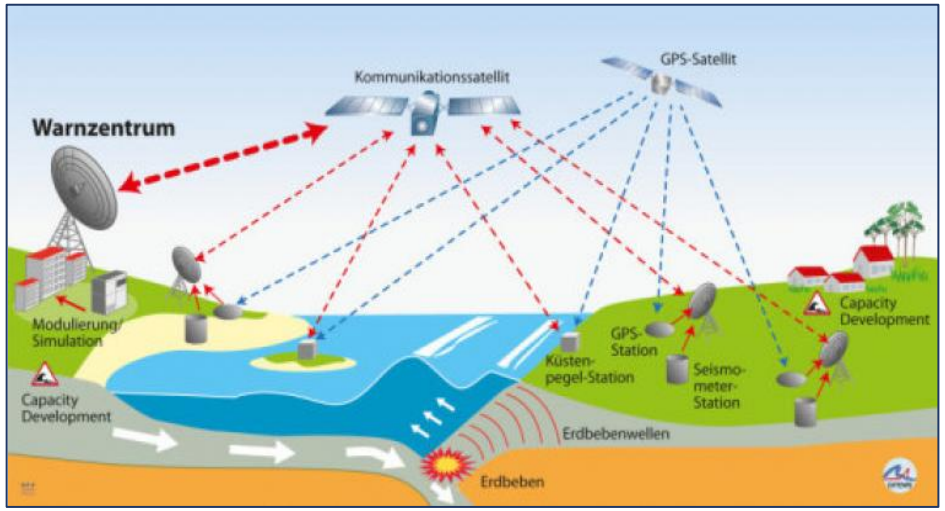
Example of monitoring of a cliff

Early Warning System

The goal of the early warning system is:

- *to estimate in advance the possibility that an area of the coast may be affected by a flood or by a strong erosion concomitantly with a storm or with the collapse of a cliff;*
- *to promptly activate safeguard measures to avoid damage to populations living close to the coasts.*





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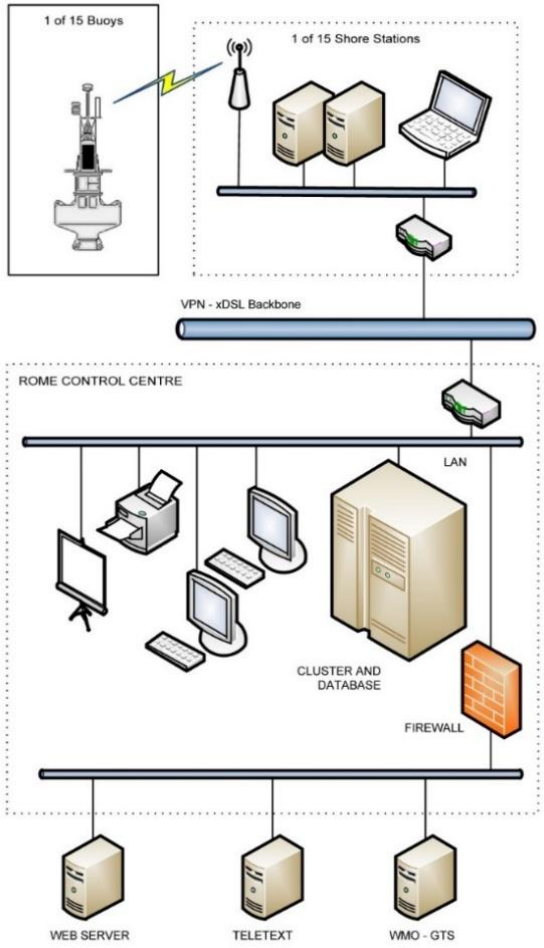
Structure of the Early Warning System

DEVELOPMENT OF THE EARLY WARNING SYSTEM IN THE TEST SITES OF THE SICILIAN AND MALTESE COASTALS

- *Data Processing Center*
- *Control Center*
- *Procedures for Intervention*
- *Broadcasting "App"*
- *Practical Application*



The Early Warning System

DEVELOPMENT OF THE EARLY WARNING SYSTEM IN THE TEST SITES OF THE SICILIAN AND MALTESE COASTALS

The Early Warning System for the prevention of risks related to the impact of extreme events allows:

- *i) to estimate in advance the possibility that a stretch of the sea and the coast may be affected by extreme events, as floods, intense erosion or collapse of cliffs;*
- *ii) safeguard measures will be promptly activated for the protection of the population living close to the coast interested by the events.*

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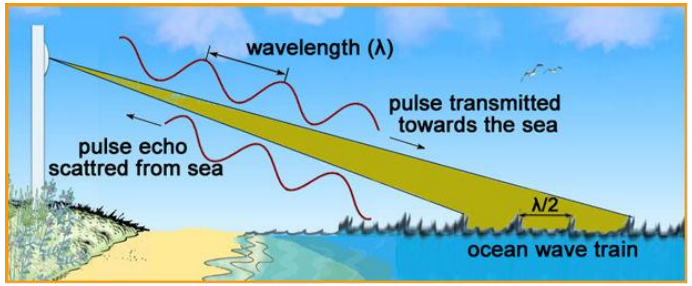
DEVELOPMENT OF A COASTAL RISK MONITORING NETWORK

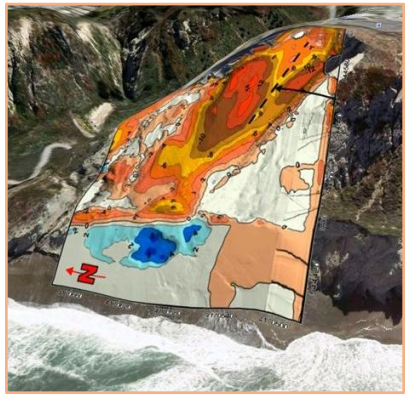
Monitoring Network of Waves

Wireless Monitoring Network

Monitoring System of Coasts

Monitoring System





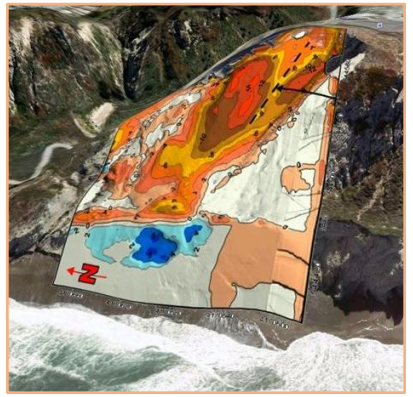
Monitoring System

Wave Climate Monitoring Network

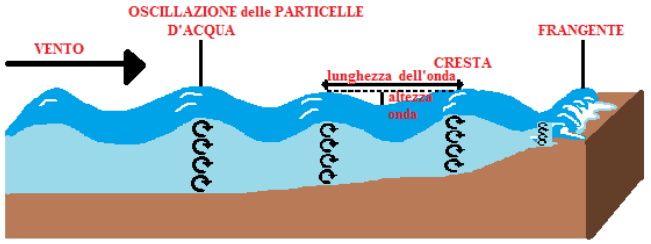
The system allows:

- *The wave climate detection through wave buoys installed in the peripheral stations (wave sensors);*
- *The wireless data transmission to the control center through a satellite communication system (agreement with the data acquisition of Calypso Project);*
- *The on site pre-processing of raw measurements.*

Interreg Italia-Malta Calypso South



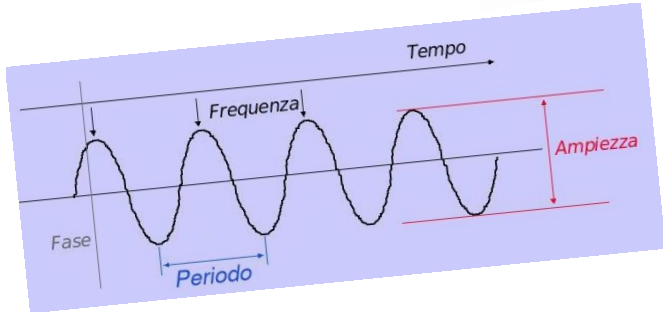
Monitoring System



Wave Climate Monitoring Network

The buoy system will provide in real time to the control system the measurements of the following parameters:

- *significant wave heights*
- *peak and mean wave periods*
- *mean wave directions*



The data collected represent an essential element of the early warning system, as they constitute the verification points in which the other components of the monitoring system (numerical models, HF radar network) will be tested and calibrated.

Directional Wave Sensors

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Location of the Test Sites

Sicily - Ragusa

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Location of the Test Sites

Maltese Islands:

i) Selmun

ii) Wied Il-Mielah

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WP2 Communication Activities

The project expect the organization of practical trainings titled "resilience fields" with activities involving directly the local population.

Two practical trainings fields will be organized (no.1 in Malta and no.1 in Sicily together with the Administrations of Pachino, Scicli, Ispica and Malta Civil Protection Department) to test the best-practices developed to simulate the risk scenarios.

OUTPUTS & CONCLUDING REMARKS

- *Topo-batigraphic and sedimentological characteristics of the studied areas;*
- *Geo-structural features of the cliffs;*
- *Hydro-morphodynamic response of the studied area to maritime conditions;*
- *Monitoring network to evaluate the main parameters for forecasting;*
- *Numerical models to detect dangerous conditions from the data collected by the monitoring system;*
- *Intervention model to identify actions and subjects to be activated;*
- *Data acquisition and control center to provide the risk levels;*
- *Components to process risk scenarios for actions to be implemented.*

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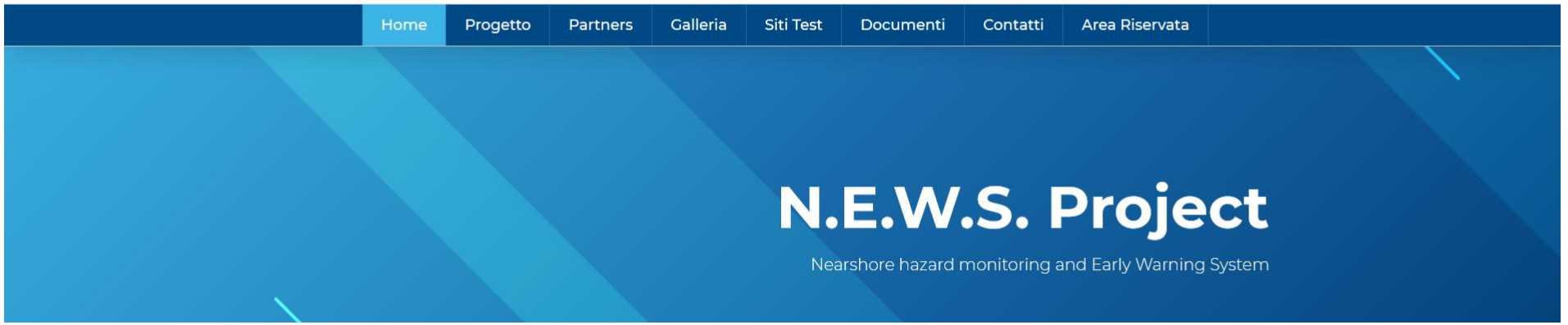
https://news-project.eu/



Il **Progetto NEWS "Nearshore hazard monitoring and Early Warning System"** ha come obiettivo lo sviluppo di un sistema integrato di monitoraggio ed early warning, nonché di adattamento ai rischi provenienti dal mare, con la finalità di segnalare alla popolazione con adeguato anticipo la possibilità di inondazioni, erosioni di litorali sabbiosi e crollo di falesie, nonché di permettere l'attivazione di misure di salvaguardia per evitare danni alle persone e cose.

Partendo da un'avanzata capacità di modellazione delle condizioni del mare e dei loro effetti sulla costa, uno dei risultati finali del progetto sarà lo sviluppo di una APP in grado di diffondere tra la popolazione (pescatori, diportisti, bagnanti, ecc.) messaggi di allerta.

Il **Progetto NEWS** è finanziato nell'ambito del Programma di Cooperazione "INTERREG V-A Italia Malta" ed è coordinato dall'Università "Kore" di Enna. Al progetto partecipano anche il Dipartimento di Ingegneria Civile e Architettura dell'Università di Catania, la Università di Malta ed il Libero Consorzio Comunale di Ragusa. Il progetto NEWS ha ricevuto la manifestazione di interesse del Dipartimento Regionale di Protezione Civile della Regione Siciliana.

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