

All Regions Workshop #1, Barcelona 5-7th Sept. 2007



LIDO: LISTENING TO THE DEEP OCEAN ENVIRONMENT



All Regions Workshop, Barcelona September 2007



General Context

LIDO proposes activities addressed to a long-term monitoring of earthquakes and tsunamis (**GEO-HAZARD**) and the characterisation of marine ambient noise with special attention to marine mammals (**BIOACOUSTICS**).

Objectives

1. to extend the present capabilities of the observatories working in the Eastern Sicily site (NEMO-SN1) and in the Gulf of Cadiz (GEOSTAR revised for NEAREST pilot experiment) by including sensor equipments related to other disciplines (bioacoustics);
2. to establish a first nucleus of a regional network of multidisciplinary seafloor observatories allowing the long term monitoring of geohazards and marine ambient noise in the Mediterranean and adjacent Atlantic waters.



General Context: Long-term Key Objectives

- to characterise the water pressure signals induced by earthquakes by comparison of time series collected in the Mediterranean Sea and the Atlantic Ocean.
- to assess the performance of two seafloor multiparameter observatories of GEOSTAR-class in different operative conditions: real-time and near real-time connection.
- Long-term ocean noise and biological sounds interactions/monitoring program;
- European ocean acoustic map by monitoring ocean noise in geographically diverse areas with emphasis on marine mammal habitats;
- Long-term mandate to the ESONET NoE to coordinate at European level the ocean noise monitoring and research, and its effects on the marine ecosystem;



> Partners

Technical University of Catalonia (LAB-UPC), Spain



Fundação da Faculdade de Ciências da Universidade de Lisboa FFCUL (Portugal)



University of Bremen MARUM/KDM (Germany)



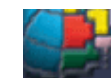
Technical University of Berlin/Technische Fachhochschule TUB/TFH (Germany)



Istituto di Scienze Marine-CNR CNR-ISMAR (Italy)



Istituto Nazionale di Geofisica e Vulcanologia INGV (Italy)



Istituto Nazionale di Fisica Nucleare INFN (Italy)



Unidad de Tecnología Marina UTM-CSIC (Spain)





Collaboration

Centro Interdisciplinare di Bioacustica e Ricerche Ambientali
(Interdisciplinary Center for Bioacoustics and Environmental Research),
Università degli Studi di Pavia CIBRA (Italy)





Justification

- ESONET needs to go from individual observatories to regional efforts, by the integration of the scientific and technological research capacity of different national teams
- LIDO intends to demonstrate the viability of the integration with particular emphasis on geophysical and biological aspects.
- *Geo-Hazards*: LIDO will fulfill the purpose of IOC/IGG-NEAMTWS providing real-time and near-to-real-time seismological and water-pressure comparative time series, and operational tools (prototypes of tsunameter) integrated in seafloor observation systems.
- *Bioacoustics*: LIDO will evaluate the human and natural contributions to marine ambient noise and describe the long-term trends in ambient noise levels, and in marine mammals populations (migration patterns, presence, and habitat use of key species, like sperm, fin and beaked whales).



Available Infrastructures

- - Eastern Sicily: NEMO-SN1 cabled multidisciplinary observatory and shore station including laboratory
- - Gulf of Cadiz: NEAREST observatory (seafloor station and surface buoy)
- - MODUS vehicle for deployment/recovery of GEOSTAR-type observatories.
- - A light work-class deep-sea ROV for 4000 m depth operation (available from 2nd half of 2008).
- - R/V Urania through application to the Ship Committee of CNR.
- - Centro Interdisciplinare di Bioacustica e Ricerche Ambientali (Interdisciplinary Center for Bioacoustics and Environmental Research), Università degli Studi di Pavia
- - Laboratory of Applied Bioacoustics, Technical University of Catalonia, Barcelona



External Available Funds

NEMO-SN1: PEGASO Project (Sicily Regional Authority)

Demo Mission Activities covered by external funds

- Recovery of SN-1 and O_v DE Station
- Enhancement of existing NEMO-SN1 infrastructure to open the node to other disciplines by integrating additional sensors and devices, specifically full depth pressure sensor for tsunami parent signal detection, and high sampling rate broadband hydrophones for marine mammal tracking.
- Recovery and new deployment by means of MODUS of the GEOSTAR observatory now operating in the Gulf of Cadiz (August 2007-Summer 2008, NEARST EC Project) for refurbishment.



LIDO Activities (1/4)

- *Activity 1* - Recovery of SN-1 and O ν DE Station
- *Activity 2* - Enhancement of existing NEMO-SN1 infrastructure to open the node to other disciplines by integrating additional devices, specifically full depth pressure sensor, high sampling rate hydrophones for marine mammal tracking.
- *Activity 3* - Recovery by means of MODUS of the GEOSTAR observatory operating in the Gulf of Cadiz for tsunami signal detection within the EC-NEAREST pilot experiment planned from August 2007 to summer 2008
- *Activity 4* - Deployment of SN-1 and O ν DE station after enhancements.
- *Activity 5* - Refurbishment (e.g., batteries and spare parts) and deployment by means of MODUS of GEOSTAR and new long-term mission (1 year) in the Gulf of Cadiz (same site as in NEAREST experiment) and integration of the GEOSTAR measurements with additional long-term time series acquired by high sampling rate standardized hydrophones installed on the GEOSTAR surface buoy for marine mammal detection and tracking.



LIDO Activities (2/4)

- *Activity 6* - Refurbishment of MODUS (e.g., spare parts).
- *Activity 7* - Refurbishment and upgrade of the O_ν DE station.
- *Activity 8* - Quality management of the planning and deployment of operation phases
- *Activity 9* - Long-term comparative testing in two seismogenic/tsunamigenic near-shore areas (Eastern Sicily and Gulf of Cadiz) of the same methodological approach developed in EC-NEAREST for Tsunami warning and risk assessment by integration of marine (seafloor and surface) and land-based data.
- *Activity 10* - Real-time detection, analysis and classification of ocean noise, including biological sources (e.g. marine mammals) through a wide network of sensors (broadband hydrophones at the observatories).



LIDO Activities (3/4)

- *Activity 11* - Implementation of advanced dsp software: real-time sampling and analysis & automatic identification and classification of biological (marine mammals) and artificial sounds.
- *Activity 12* - Implementation of a data collection and dissemination service based on the Sensor Web Enablement (SWE) and Spatial Data Infrastructure (SDI) concepts and compliant to the GEOSS guidelines allowing interoperability and demonstrating this service concept by including and presenting data from a non-European site, like MARS, SEACOOS or VENUS.
- *Activity 13* - Standardisation and real-time transmission of marine mammal acoustic signals and acoustic images from seafloor cabled observatory to public institutions (e.g. Aquaria and Museums). Creation and management of acoustic archives with user-friendly interfaces.



> LIDO Activities (4/4)

- *Activity 14* - Analysis of long-term trends in ambient noise levels, especially from human activities (influenced for example by increasing shipping)
- *Activity 15* – Analysis of long-term trends in marine mammals populations (migration patterns, presence, and habitat use of key species, like sperm, fin and beaked whales).
- *Activity 16* – Analysis of long-term trends of noise interactions (e.g. masking of communicative sounds, behavioural disruptions and cumulative impacts on hearing) with marine mammal sounds (key species, like sperm, fin and beaked whales).
- *Activity 17* - Test of low cost acoustic detectors/recorders to be implemented in additional locations to extend the monitoring network and possibly evaluate new European sites for long term monitoring.



LIDO Expected Results

- Establishment of a first homogeneous network of multidisciplinary observatories in two ESONET key-sites
- Multidisciplinary time-series useful to increase the knowledge and studying the phenomena variability in an extended time scale (months-years)
- Development of a first version of an ESONET NoE database on artificial and marine biological sources (especially whales and dolphins).