OOCMur - Coastal Ocean Observing System in Murcia Region

(SE Spain, South-Western Mediterranean)

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ABSTRACT

OOCMur (Coastal Ocean Observing System of Murcia Region) is a Singular Scientific and Technological Infrastructure (ICTS), promoted by the Spanish Ministry of Science and Innovation and the Regional Government of Murcia. It will be located in Cartagena (Murcia Region, Spain) in the South-Western Mediterranean. OOCMUR will be devoted to the study of oceanographic and ecological processes linked to changes produced by climate change, especially on biodiversity, colonization of allochthonous species with an enhanced focus in coastal lagoons, marine protected areas and open coastal ecosystems. The infrastructure will be open and will provide facilities and services to all international scientists interested in developing new technologies and marine researches, analyzing genetic samples, and performing comparative studies at different spatio-temporal scales.

1. GENERAL INFORMATION

OOCMur is a Singular Scientific and Technological Infrastructures (ICTS) to be implemented in Spain co-financed by the Spanish Ministry of Science and Innovation and the Regional Government of Murcia. It will be located in Cartagena (Murcia) 10 miles from the Mar Menor coastal lagoon – one of the largest in the Mediterranean -, 18 miles from the Cape Palos marine protected area (15 years working up to date), and 8 miles from Cape Tiñoso, a new marine protected area to be established in 2010.

The Cape of Palos (Fig. 1C) is a biogeographical boundary and a transitional area between the Atlantic and the Mediterranean. OOCMur is devoted to study the influence of climate change on marine ecological processes at regional scales driving marine biodiversity changes, including connectivity between populations at different spatio-temporal scales.

Fig. 1 shows the location (A), bathymetry of the area (B), the Cape of Palos front (C) and the Mar Menor lagoon (D). The bathymetry shows a flat, less than 60 m depth, continental shelf east to the Mar Menor lagoon. As the Lagoon is hypersaline the adjacent platform is largely influenced by the lagoon outflows. A very steep slope, reaching 2500 m in less than 3 miles to the coastline, is found in the Southern area with a major submarine canyon located in front of the cape Tiñoso.

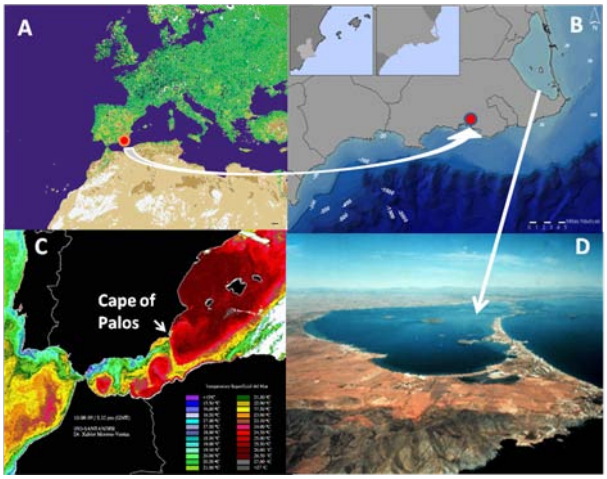

Figure 1. A) Location of OOCMur, B) Bathimetry of the area, C) Thermal image showing the Cape of Palos Front, D) The Mar Menor coastal lagoon.

2. AIMS AND SCOPE.

Knowledge of the components and process in ecosystems is the base for ecosystem management from local level to the development of transnational policies. At Mediterranean basin scale became necessary the integration and coordination of information between research groups and administrations of involved countries. It is, therefore, needed to develop local observatories that, linked in networks, provide local information to be integrated into Mediterranean basin and worldwide scale.

General objectives of OOCMur are: 1) To create a base of work for researchers in southern Mediterranean and worldwide interested in oceanographic and biological processes linked to climate change consequences on biodiversity, coastal lagoon processes and ecosystem responses to human impacts, 2) Provide facilities and services for stakeholders (oceanographic and ecosystems forecasting, environmental impact assessment, aquaculture development, development of uses in the coastal zone, development of fisheries and ecosystem management tools, marine protected areas design, population genetic analyses, etc.), 3) Provide facilities and services for technological developments in oceanography and 4) Contribute to the generation of regular and long term series of data linked in observation networks to forecast and prevent the consequences of climate change on biodiversity and coastal processes.

OOCMur three main goals are: 1) Technological developments for observing systems, 2) Study of ecological processes under a global change scenario, and 3) High resolution hydrodynamic and ecosystem modeling.

Technological developments for observing systems will include: 1) Subsea robotics and underwater vehicles (TUVs, ROVs, AUVs and Gliders), 2) Marine instrumentation (MEMs, artificial vision systems), 3) Network sensors applied to marine observation, 4) Subsea communication and telematic services, 5) Off-shore platforms and, 6) UAV for oceanographic observation.

Studies of Ecological processes under a global change scenario will include: 1) Biodiversity and function of marine ecosystems, 2) Ocean genomics and marine population genetics, 3) Invasive species and blooms, 4) Impact on marine ecosystems, 5) Spatial and Temporal scales determining populations connectivity and, 6) Development of indicators for climate change observation and prediction.

High resolution hydrodynamic and ecosystem modeling will include: 1) 3D High resolution hydrodynamic modeling for operational oceanography, 2) Ecosystem modeling, 3) Observation and prediction of climate change on physical and biological factors, 4) Application of modeling to sound based technological developments and, 5) Remote sensing.

3. OPERATIONAL INFRASTRUCTURE

Land facilities will include: 1) Mechanical and electronic workshops and laboratories for maintaining and development of ocean instrumentation, particularly buoys, TUVs, ROVs, AUVs and gliders, 2) Computational facilities for data assimilation and high resolution numerical modeling for operational oceanography including forecast of currents, waves, sea level, temperature, salinity, chlorophyll and other water quality and ecosystem modeling parameters, 3) Chemical and biological laboratories including genetic analyses of species and populations as a tool to study biodiversity and connectivity between marine populations.

Sea facilities will include: 1) 6 coastal buoys equipped with met stations, temperature, salinity, turbidity, chlorophyll, OD, CDOM, nitrate and ADCPs; 2) 3 deep water buoys; 3) Several underwater autonomous vehicles, 4) two cabled observatories - one from Cape Palos to its marine protected area up to 40 m depth, another in the Cape Tiñoso marine protected area extended up to 2500m depth trough the Cape Tiñoso submarine canyon. Fig. 2 shows a summary of the spatial distribution of buoys and cable nodes to be deployed together with transects for different underwater vehicles.

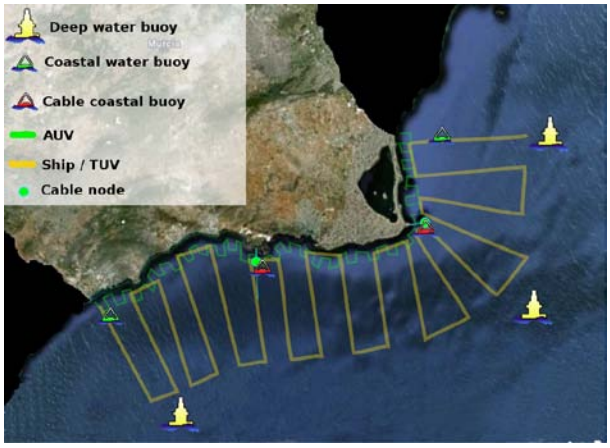

Figure 2. General view of the instrumentation and oceanographic transects to be covered with different underwater vehicles.

OOCMur will be a large facility open to the international research community under international peer review selection process with open infrastructure and facilities available to all research groups interested in using them through research projects including mobile instruments. Long term time series of observations on hydrographic and biodiversity parameters, from coastal lagoons to coastal and open sea ecosystems, will be available on line and integrated in observing networks.

OOCMur will be integrated in European and other international networks of coastal ocean observatories. Data bases of physical, chemical and biological oceanographic parameters will also be available online.