

## CIM-UVIGO mesocosms facilities: a realistic experimental approach for grand challenges in oceanography

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**Abstract** – Marine mesocosms, the closest experimental approach to the marine ecosystems, are a powerful tool to study ecosystems functioning, to address those problems derived from global change and to test mitigation strategies. During the last years the CIM-UVIGO has worked to create a highly automated mesocosm facility able to address a wide range of studies, from benthos to pelagic communities, simulating different environmental conditions and future scenarios.

**Keywords** – Mesocosms, global change, oceanography, grand challenges

### I. INTRODUCTION

Mesocosms are experimental water enclosures close to natural conditions, in which environmental conditions can be manipulated in a realistic way. They represent the closest experimental approach to the natural environment, with greater volumes than laboratory experiments, including different trophic levels. They represent a powerful tool to study the real world but also to simulate future scenarios and to address grand challenges [1] (acidification, brownification, warming, eutrophication, pollution, etc.) and to test possible remediation approaches for those problems derived from global change, as ocean alkalization, artificial upwelling, etc.

### II. CIM-UVIGO MESOCOSMS FACILITIES

Mesocosms facility of the Centro de Investigación Mariña de la Universidade de Vigo (CIM) has capacity to allocate different experimental designs, including benthic, pelagic and benthopelagic experiments (Fig.1). This highly automated system includes real-time monitoring of the experimental tanks and the environmental conditions, measuring the main variables with a 10 minutes frequency (temperature, conductivity, dissolved, oxygen, pH, irradiance, etc.). A tide-simulation system is also installed in the tanks, in which the range of the tide can be defined by the user and both temperature and salinity can be set-up to vary with the tide, simulating the changes observed at the inner part of the estuaries during the tidal cycle. This facility is able to provide 30 m<sup>3</sup>/h of natural or filtered seawater at environmental temperature, cooled up to 12°C or warmed up to 25°C. Water can be UV disinfected and the experimental tanks include air and gasses supply (O<sub>2</sub> and CO<sub>2</sub>) as well as fresh water. All the processes to control the water supply are also automated, with real-time monitoring and control of pumps, heating and cooling systems and alarms set to send a notification in case of deviation from the set-up values.



Fig 1. Experimental tanks for pelagic, benthopelagic and benthic mesocosms experiments.

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This infrastructure is managed as a general service provided by the Oceanography Unit of the Estación de Ciencias Mariñas de Toralla (ECIMAT), a Research Support Center (CAI) organically dependent on the CIM, with the capacity to invoice and provide the necessary technical assistance. It is available to the international community through the European Marine Living Resources Research Infrastructure (EMBRC-ERIC) to which ECIMAT belongs, through the European mesocosms network (AQUACOSM-plus H2020 project) and through the participation of CIM research groups in other European infrastructure networks such as EMSO or EPOS.

#### REFERENCES

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