

# Numerical modelling to the rescue: environmental models as a novel tool in simulating the trajectory of jellyfish blooms within coastal ecosystems – a case study from the Maltese Islands (Central Mediterranean)

JBS-12 / Oral Presentation\_03

**Andrea Cucco<sup>1</sup>, Georg Umgieser<sup>2</sup>, Alan Deidun<sup>3</sup>, Aldo Drago<sup>3</sup>, Joel Azzopardi<sup>3</sup>, Denis Cutajar<sup>3</sup>, Adam Gauci<sup>3</sup>, Antonio Canepa<sup>4</sup>, Ons kéfi-Daly<sup>5</sup>, Nejib Daly Yahia<sup>6</sup>, Veronica Fuentes<sup>7</sup>, Stefano Piraino<sup>8</sup>**

<sup>1</sup> IAMC-CNR, Oristano, Sardinia, Italy

<sup>2</sup> ISMAR-CNR, Venice, Italy

<sup>3</sup> Department of Geosciences, University of Malta (UoM), Malta

<sup>4</sup> Escuela de Ciencias del Mar, Pontificia Universidad Católica de Valparaíso, Chile

<sup>5</sup> Tunisian National Institute of Agronomy (UR Marine Biology), Tunis, Tunisia

<sup>6</sup> Laboratory BFSA, Faculty of Sciences of Bizerte, University of Carthage (UR Biologie Marine Univ. El Mannar), Tunisia

<sup>7</sup> Institut de Ciències del Mar, CSIC, Barcelona, Spain

<sup>8</sup> Consorzio Nazionale Interuniversitario per le Scienze del Mare (CoNISMa), Lazio, Italy

A numerical tool based on coupled hydrodynamics and environmental models was developed and applied to the coastal areas of the Maltese archipelago, with the aim of implementing a decision-support system for coastal managers. The hydrodynamic component of the system (ROSARIO-SHYFEM) is operational and provides daily a 4 days forecast of the main 3D hydrodynamics fields for the areas covering the Malta-Sicily Channel with a spatial resolution varying between a few km up to 50 m.

The main objective of the tool is to predict the trajectory to be assumed by a jellyfish bloom by providing a four-day forecast of the path to be taken by the same bloom. The ROSARIO-SHYFEM model was coupled with a particle-tracking Lagrangian model in order to simulate the diffusion of numerical particles, proxy of jellyfish, inside the area of interest, providing a 4-day forecast for the trajectory of a jellyfish bloom.

The system was integrated into a Web Application which will allow users to define the position in time and space of a hypothetical bloom found in the Maltese waters, to select the amount of particles to simulate the jellyfish biomass and to choose between blooms of *Pelagia noctiluca* and *Cotylorhiza tuberculata*, the two main blooming species in this part of the Mediterranean. The tool is freely available through the MED-JELLYRISK Project website ([www.jellyrisk.eu](http://www.jellyrisk.eu)). Full validation of this dispersion forecasting system, through the deployment of water drifters for example, is still ongoing.

## **Alan Deidun**

Department of Geosciences, University of Malta (UoM)  
Malta  
[alan.deidun@um.edu.mt](mailto:alan.deidun@um.edu.mt)