

MORPHOLOGY AND EVOLUTION OF COASTLINES AND SEABEDS

The dynamic interplay between natural processes and human activities shapes coastal and marine landscapes, positioning them as vital zones for environmental research and management.

The *Morphology and Evolution of Coastlines and Seabeds* session aims to explore a variety of approaches and studies that reveal the complexity of these ecosystems, highlighting their fragility and resilience.

The studies cover ecological conservation, sustainable development, and the integration of advanced technologies such as machine learning, 3D GIS, and remote sensing to analyze coastal dynamics.

Case studies from Italy, Spain, and Croatia will be presented, highlighting the role of innovation in addressing climate challenges, guiding coastal defense, and informing risk management strategies for sustainable environmental management.

From the sandy beaches of Sardinia with its "*Posidonia oceanica*" banks (*Cabrita et al.*) to the innovative use of artificial reefs in Riccione (*Cleo and Santi*), the examples presented illustrate the delicate balance between ecological conservation and sustainable development.

Cutting-edge methodologies, such as the application of machine learning to soil salinization studies (*Della Vaglie and Martellozzo*) and 3D GIS techniques to analyze cliff morphodynamics (*Cohen et al.*), demonstrate how technology can improve our understanding and support informed decision-making.

Efforts to monitor coastal erosion, such as studies in Molise (*Di Paola et al.*), and modeling of sediment dispersal in Spain and Croatia (*Lopez and Pagan, Pikelij et al.*), underline the urgent need to address the challenges posed by climate change and human pressures.

Similarly, innovative tools such as unmanned aerial vehicles (*Lupicchini et al.*) are advancing research on the impacts of different parameters on coastal systems.

This session also highlights the transformative role of remote sensing and other advanced technologies in studying coastal dynamics.

Examples include the reconstruction of beach ridges in the Ombrone river delta (*Mammi and Rossi*), shoreline detection using hyperspectral imagery in the Gulf of Oristano (*Terracciano et al.*), and monitoring of soil sealing along Mediterranean coasts (*Iasillo et al.*).

These interdisciplinary studies deepen our understanding of coastal processes and provide strategies for coastal defense (*Garcia Lozano et al.*) and hazard management (*Rizzo et al.*).

By bridging scientific innovation with practical applications, this session contributes to the ongoing discourse on sustainable management of coastal and marine environments.

*Giovanni Sarti
Department of Earth Sciences
University of Pisa
email giovanni.sarti@unipi.it*