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Multidisciplinary assessment and prediction tools addressing coastal vulnerability to erosion and sea level rise. Lessons learnt from the RITMARE Project.

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Natural processes and human activities are strongly connected, and sometimes conflicting, in the evolution of coastal and transitional environments. The strong anthropic pressure on coastal regions, together with the effects of a changing climate, demands nowadays more pressingly for efficient tools to characterise and predict the behaviour of such systems in order to define appropriate response strategies. This requires a deep understanding of the connections among different drivers and different scales, a multidisciplinary challenge in which heterogeneous data, approaches and scales need to be framed within a consistent dynamical description.

To this aim, a specific research line was dedicated to "Coastal Vulnerability to Erosion and Sea Level Rise" within the RITMARE Project, supported by the Italian Ministry of University and Research with the purpose of integrating the Italian Marine community in shared research fields in the period 2012-2017. The activities carried out in this framework have been moving along interconnected branches tackling the themes related with sea level rise, ocean modelling, and geomorphological assessment in present conditions and in different climate change scenarios, with an eye on the exploitation of marine sand as a strategic resource.

In this contribution we review the main outcomes of this multidisciplinary and coordinated research. Besides discussing the advances and the possibilities from state-of-the art technologies and methodologies, we point out that a coordinated use of the described tools should be promoted in the design of survey and monitoring activities, as well as in the exploitation of already collected data. Expected outcomes of this strategy include the implementation of improved policies and infrastructures for coastal protection, flanked by reliable short-term forecasting systems and efficient rapid response protocols, in the framework of an integrated coastal planning at the multi-decadal scale.

Keywords: Coastal Monitoring, Multi-Scale Modelling, Climate Change

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