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Integrated sea storm management strategy: the 29 October 2018 event in the Adriatic Sea

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Sea storms represent the main threat in the coastal areas. Sea storms directly impact the quality of life of citizens (especially in urban areas where part of the inhabited areas is seldom covered by water), they create damages to the important cultural heritage exposed to these phenomena, and they also affect businesses (aquaculture, fisheries, tourism, beach facilities) and environment at large (coastal erosion, floods). The potential future effects of global climate change emphasise the need for strategies based on an anticipatory approach particularly in coastal areas at immediate and high risk. The difficulty of reacting promptly to extreme events is also connected to the lack of shared data, know-how and decision support systems. As weather, climate and ocean know no national boundaries, the insufficient level of cooperation among countries is often a cause of ineffective actions at local level and missed opportunities to collaborate with other actors to increase overall preparedness to sea storms.

The problem of sea storms is particularly relevant for the Adriatic Sea, where extreme sea levels are higher than in other parts of the Mediterranean basin and several coastal cultural World Heritage sites at risk from coastal flooding and erosion are located. This study presents the management approach for sea storm hazard initiated as part of the EU-funded Integrated Sea sTORm Management Strategies (I-STORMS) project for the coastline of the Adriatic-Ionian macro-region. This study presents a joint strategy to safeguard the Adriatic area from sea storm emergencies by sharing knowledge, data and forecasts among involved countries and improving their capacities in terms of early warning and management procedures. We developed a shared and interoperable system (Integrated Web System - IWS) to allow the exchange, simultaneously in an aggregated and standard way, of information at a basin scale. IWS can support decision makers and civil protection operators in taking decisions and issuing warnings and bulletins. The IWS was designed to specifically store, visualize and share historical and real-time time series of observations from fixed-point sensor networks as well as outputs from existing operational forecast models (multi-model ensemble). In order to draw the map of storm risk characterisation of the Adriatic coasts, we subdivided the coast in segments of variable length in function of coastal morphology, human settlements and administrative boundaries. For each of these units the system provides information on the predicted extreme sea levels/waves and the number of people exposed to these severe sea conditions. This study focuses on the recent exceptional storm event occurred on the 29th of October 2018, which is here taken as pilot study for applying and testing the developed methodology. This event reached the records of the second highest sea state ever measured all along the Adriatic coasts.