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SLR-induced temporal and spatial changes in hotspots to storms along the Catalan coast

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Coastal hotspots to storms can be simply defined as locations where the magnitude of the storm-induced risk is significantly higher than neighbouring areas for a given probability of occurrence. Their distribution along the coast depends on the magnitude of storm-induced hazards and on the coastal resilient capacity.
Increasing damages observed in our coasts during the last decades have driven the need to include specific chapters on risk management in ICZM plans. In this context, the identification of hotspots is one of the first points to be considered. This permits to better allocate resources for risk management by concentrating efforts in specific locations.
Within this context, we have identified hotspots along the Catalan coast (Spanish Mediterranean) to storm-induced erosion and inundation hazards. This has been done by using the methodology developed within the RISCKIT EU project where storm-induced hazards (erosion and inundation) are characterised in probabilistic terms by using simple inundation and erosion models as a function of water level and wave climates and local coastal morphology. The final result was a set of inundation and erosion hotspots along the coast under current conditions for selected probabilities of occurrences, P. For low return periods, Tr, few hotspots appear and they represent coastal locations frequently affected by the corresponding hazard. On the other, for high Tr, a larger number (and of larger extension) of hotspots appear, that although less frequently affected, they are subjected to a larger impact.
Although this is valuable information for coastal managers, it is only valid for making decisions for a short time horizon or under steady conditions. However, since the proper time scale for coastal planning is in the order of several decades, it is not likely that conditions will remain steady. Thus, although most of existing predictions of climate-induce changes in storminess in the Mediterranean indicate the absence of any significant increasing trend, this does not imply that storm-induced coastal hazards will not change. Thus, SLR will induce a series of long-term changes in coastal areas that although not directly affecting storminess will modify the coastal resilient capacity and, thus, changing coastal storm risks.
To provide long-term predictions of hotspot, we have assessed the long-term SLR influence on erosion and inundation risks. To do this, an equilibrium-based approach has been adopted in which background SLR-induced shoreline retreat and beach vertical response are assessed for different SLR scenarios. Obtained values are used to predict future coastal morphology and to compute the resilient capacity for each beach at any time horizon. With this information, future erosion and inundation risks and corresponding new spatial distributions of coastal hotspots are calculated for selected probabilities. Obtained results show a significant increase in hotspots along the coast, with most of the changes concentrated in areas with small accommodation space and dominated by mild slope shorefaces. The extension of the new hotspots seems to indicate than unless land planning is considered as a tool for risk reduction, massive protection need to be implemented in certain areas.