Geophysical Research Abstracts
Vol. 16, EGU2014-12200, 2014
EGU General Assembly 2014

RSLR-induced increase of vulnerability to storms along the Catalan coast (NW Mediterranean)

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Climate-related hazards are affecting coasts worldwide and they are likely to increase during the next decades (Nicholls et al., 2007). If we also consider that values at exposure are also increasing, coastal areas will very likely be exposed to increasing risks. Due to this, to properly develop sustainable coastal risk management plans it is necessary to consider climate-change induced effects as an additional forcing.

Within this context, vulnerability assessment is a useful tool to help managers to make decisions in resource allocation and development of DRR plans. Vulnerability can be simply defined as the potential of a coastal system to be harmed by a given hazard. The negative contribution (susceptibility) is characterized through the magnitude of main induced processes (erosion and inundation) whereas the positive one (resilience) is parameterized in function of beach geomorphology. With respect to extreme events, Bosom and Jiménez (2011) presented a framework to assess coastal vulnerability to storms at regional scale adopting a probabilistic approach. In this work, this framework is enlarged by including the potential effects of RSLR on the vulnerability assessment.

Thus, RSLR-driven processes (erosion and inundation) are accounted through their induced modifications on beach morphology that can affect the beach capacity of response or, in other words, its adaptation capacity. The inclusion of this effect in the vulnerability framework significantly changes coastal vulnerability values to storms at any probability of occurrence without the need of considering any change in storminess. The magnitude of the vulnerability increase depends on the considered RSLR scenario and the coastal geomorphology.

This integrated framework has been applied to 219 km of the Catalan coast (NW Mediterranean) considering different RSLR scenarios and time projections. Preliminary results obtained for a Tr = 50-y and the medium RSLR scenario (3.8 mm/y + subsidence) indicate a significant increase in coastal stretches with a high and very high vulnerability to storms. Thus, regarding erosion, these vulnerable stretches increase from 28 % of the coast under current conditions to 39 % and 49 % in 25-y and 50-y projections. With respect to inundation and, considering the dynamic response of the coast, the increase is smaller, from 31 % to 35 % and 40% respectively.

References

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Acknowledgements

This work has been done in the framework of the PaiRisC-M (CTM2011-29808) and RISC-KIT EU FP7 research project (603458). First author was supported by a Ph D Grant from the Spanish Ministry of Education.