Geophysical Research Abstracts
Vol. 20, EGU2018-7100, 2018
EGU General Assembly 2018

Protection of coastal urban fronts against global warming

Juan Del-Rosal-Salido (1), Pilar Díaz-Carrasco (1), Pedro Magaña (1), Rafael J. Bergillos (1), María Clavero (1), Alejandro López-Ruíz (1), Miguel A. Losada (1), Antonio Moñino (1), Maria G. Neves (2), Rodolfo Silva (3), Edgar Mendoza (3), Sebastian Solari (4), and Miguel Ortega-Sánchez (1)

(1) Instituto Interuniversitario de Investigación del Sistema Tierra en Andalucía – Universidad de Granada. Edificio CEAMA, Avenida del Mediterráneo, s/n, 18006, Granada, España. , (2) Laboratorio Nacional de Engenharia Civil. Avenida do Brasil, 101 1700-066 Lisboa, Portugal. , (3) Instituto de Ingeniería. Universidad Nacional Autónoma de México. Circuito Escolar s/n, Ciudad Universitaria, Delegación Coyoacán, México D.F., 04510. , (4) Instituto de Mecánica de Fluidos e Ingeniería Ambiental. Universidad de la Republica. Avenida 18 de Julio 1824-1850, 11200 Montevideo, Uruguay.

Global warming associated to climate change is producing a progressive rising of the sea level. The consequences of this sea level rise will affect millions of people, including infrastructures, industry, tourism and trade (Hinkel et al. 2014 and Vousdoukas et al. 2017). These effects will be amplified in the coastal fronts of urban areas due to the high concentration of activities, services and population. The expected impacts will demand coastal protection measures whenever possible, mainly because relocating the activities as a generalizable alternative is not feasible.

Flooding risk in coastal urban fronts is mainly dominated by the concomitant action of maritime, atmospheric and fluvial drivers. Furthermore, on estuarine or deltaic areas the river discharge must also be included in the analysis. The complexity of the drivers and their interactions in these environments require joint probability methods for their appropriate assessment; in addition, sea level rise and the modification in the storm patterns induced by global warming will change the probability of having extreme events.

This work is focused on introducing the international project “Protection of Coastal Urban Fronts against Global Warming (PROTOCOL)” (CYTED 917PTE0538, 2017-2020). This project addresses this topic with the aim of developing an assessment methodology and establishing recommendations for the design of coastal protections on urban fronts. The methodology is based on a global approach applied at local scale with the following main components: (1) quantification of the drivers and actions considering their different scales of affection and the predicted scenarios (projections) of sea level rise; (2) risk assessment at the coastal urban front (detailed scale); and (3) calculation of the overtopping rates and flooded areas based on the types of protection (including nature-based solutions) and the envisaged scenarios. Five study areas along the Ibero-American coasts have been selected in Spain, Mexico, Portugal and Uruguay to apply the developed methodology, including both estuarine and coastal sites. Some preliminary results for the Spanish study sites will be presented at the Conference.

The project will generate products of great value not only for the countries involved, but also for the scientific community: databases and user-friendly tools to be applied by public administrations, companies and entities working in the maritime-coastal environment. The expected impacts of this project should be reflected in: (1) a reduction in investment costs to protect against sea level rise, (2) an update in the scientific-technical methods to meet the protection needs of the coastal urban fronts in the upcoming decades, (3) an improvement in the technological credibility of this process with the society and (4) international and national transfer of this knowledge gaining in competitiveness and competence.

References:
Hinkel, J., Lincke, D., Vafeidis, A.T., Perrette, M. et al., 2014. Coastal flood damage and adaptation costs under 21st century sea-level rise. Proc. Natl. Acad. Sci. U. S. A. 3292–3297.
Vousdoukas, M.I., Mentaschi, L., Feyen, L., Voukouvalas, E., 2017. Earth’ s Future Extreme sea levels on the rise along Europe’ s coasts Earth’ s Future 1–20.