Geophysical Research Abstracts
Vol. 19, EGU2017-17622-1, 2017
EGU General Assembly 2017

Vulnerability of marginal seas to sea level rise

Damia Gomis and Gabriel Jordà
IMEDEA (UIB-CSIC), IMEDEA, Esporles, Spain (gabriel.jorda@uib.es)

Sea level rise (SLR) is a serious thread for coastal areas and has a potential negative impact on society and economy. SLR can lead for instance to land loss, beach reduction, increase of the damage of marine storms on coastal infrastructures and to the salinization of underground water streams. It is well acknowledged that future SLR will be inhomogeneous across the globe, with regional differences of up to 100% with respect to global mean sea level (GMSL). Several studies have addressed the projections of SLR at regional scale, but most of them are based on global climate models (GCMs) that have a relatively coarse spatial resolution (>1º). In marginal seas this has proven to be a strong limitation, as their particular configurations require spatial resolutions that are not reachable by present GCMs. A paradigmatic case is the Mediterranean Sea, connected to the global ocean through the Strait of Gibraltar, a narrow passage of 14 km width. The functioning of the Mediterranean Sea involves a variety of processes including an overturning circulation, small-scale convection and a rich mesoscale field. Moreover, the long-term evolution of Mediterranean sea level has been significantly different from the global mean during the last decades. The observations of present climate and the projections for the next decades have lead some authors to hypothesize that the particular characteristics of the basin could allow Mediterranean mean sea level to evolve differently from the global mean. Assessing this point is essential to undertake proper adaptation strategies for the largely populated Mediterranean coastal areas.

In this work we apply a new approach that combines regional and global projections to analyse future SLR. In a first step we focus on the quantification of the expected departures of future Mediterranean sea level from GMSL evolution and on the contribution of different processes to these departures. As a result we find that, in spite of its particularities, Mediterranean Sea level would follow global changes with departures lower than + 5 cm. In a second step we use the same methodology to obtain SLR projections at global scale in order to assess the vulnerability of other coastal areas. Namely, we define a vulnerability index based on relating the characteristics of present day variability with SLR projections under different scenarios. Results show that the averaged vulnerability index is 0.5 for scenario RCP8.5 (projected SLR is about a half of the maximum sea level recorded in the last decades). However, in the Mediterranean, the Caribbean and the Sea of Japan the vulnerability index is much higher (2.6, 2.4 and 2.1, respectively). From this point of view, therefore, these regions could be considered the most vulnerable regions in the world.