RELATIVE SEA LEVEL RISE PROJECTIONS BY 2150 AND FLOODING HAZARD ALONG THE COASTS OF THE MEDITERRANEAN SEA

Marco Anzidei, Istituto Nazionale di Geofisica e Vulcanologia, marco.anzidei@ingv.it
Antonio Vecchio Radboud Radio Lab, Department of Astrophysics, Radboud University, Nijmegen, The Netherlands
LESIA, Observatoire de Paris, Université PSL, CNRS, Sorbonne Université, Université de Paris, Meudon, France
a.vecchio.alberti@astro.ru.nl
Enrico Serpelloni, Istituto Nazionale di Geofisica e Vulcanologia, enrico.serpelloni@ingv.it
Tommaso Alberti Istituto Nazionale di Geofisica e Vulcanologia tommaso.alberti@ingv.it

Abstract
Sea level rise is one of the main global threats caused by global warming. Recent studies and IPCC reports (www.ipcc.ch) show that global sea levels could rise up to 1.0 m by 2100 and near 1.5 m by 2150. Instabilities of west Antarctica and Greenland ice sheets could lead to higher sea level rises than expected today.
In addition, vertical land movements (VLM) for natural or anthropogenic causes play a crucial role to accelerate the sea level rise along the coasts, even doubling the rates of sea level rise, increasing land flooding and erosion. The contribution of VLM needs to be estimated and included in the analysis for more accurate Sea Level projections and flooding scenarios. In the frame of two European projects (SAVEMEDCOASTS, www.savemedcoasts.eu and SAVEMEDCOASTS2, www.savemedcoasts2.eu) and other national initiatives funded by the Italian Ministry of Research (MUR), we focused on the Mediterranean region which is characterized by thousands of km^2 of low coastal plains located at even less than 2 m above the sea level. Given the current rate of sea level rise at about 4 mm/yr and the not reassuring climate projections, these areas are highly prone to be flooded by sea level rise in the next decades, particularly where land is subsiding.
We used IPCC data from the AR6 Report to estimate relative sea level rise projections and flooding scenarios for different socio economic climate pathways for 2030-2050-2100-2150 in the Mediterranean region. In combination with the trend of VLM from geodetic data derived from GNNS networks, we provide the relative sea level rise projections for costal sectors of 0.5° x 0.5°of size. We focus on the main coastal plains, the largest deltas of the Nile and Po rivers, the fragile coasts of France, Greece and the north Adriatic Sea, besides small islands and other densely inhabited coastal areas. In addition, this area is experiencing extreme meteorological events which are becoming more frequent due to anthropogenic global warming, posing serious concerns on societal and economic impacts and asking for mitigating strategies, as for Venice. We further examined the capability of the MoSE (Experimental Electromechanical Module), a safeguarding system recently put into operation, in mitigating extreme flooding events and its operational performances in relation with the values of the two dynamical indicators.
Since many Mediterranean countries are heavily dependent on tourism and other coastal activities (e.g., agriculture, farming, and maritime industry), the social and economic impacts of the SLR are very significant and urge for mitigating strategies. Despite this global threat, the risks associated to the SLR are not yet well understood by the population, claiming for an adequate awareness to implement appropriate mitigation and adaptation policies. A more consolidated collaboration among scientists, decision-makers and stakeholders involved in the management of the various aspects and effects of climate change and SLR, is needed to fill the gap between science and policy. Furthermore, the involvement of local stakeholder in decision-making regarding SLR, is mandatory. Decision-makers and land planners often fail to recognise the importance of their knowledge about the local environmental and socio-economic characteristics. Therefore, stakeholders feel powerless, or even removed, from the causes, impacts and solutions to SLR.

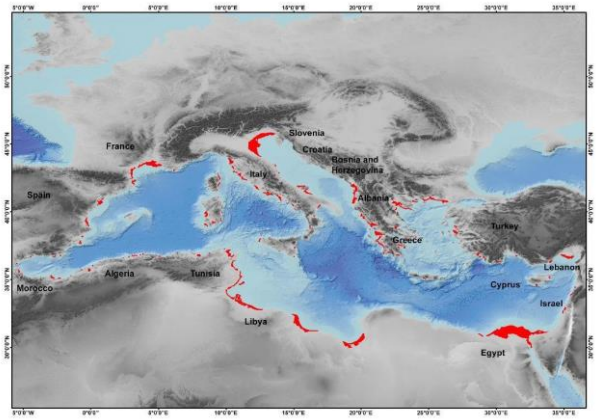

Figure 1 – The main coastal plains of the Mediterranean basin (in red). The area potentially prone to be flooded is about 38529 km^2

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