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# Relative sea-level rise scenarios for 2100 in the Venice lagoon by integrated geodetic data, high-resolution topography and climate projections. New insights from the SAVEMEDCOASTS-2 Project.

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Here we show and discuss the results arising from the SAVEMEDCOASTS-2 Project (Sea Level Rise Scenarios along the Mediterranean Coasts - 2, funded by the European Commission ECHO) for the Venice lagoon (northern Italy). We used geodetic data from global navigation satellite system (GNSS), synthetic aperture radar interferometric measurements (InSAR) from Copernicus Sentinel-1A (S1A) and Sentinel-1B (S1B) sensors and sea-level data from a set of tidal stations, to show subsidence rates and SLR in this area. The lagoon is well known for centuries to be prone to accelerated SLR due to natural and anthropogenic land subsidence that is causing increasing events of flooding and storm surges exacerbated by climate change. We focused on selected zones of the lagoon, characterized by particular heritage, coastal infrastructures and natural areas where the expected RSLR by 2100 is a potential cause of significant land flooding and morphological changes of the land. Results of the multi-temporal flooding scenarios until 2100 are based on the spatially variable rates of vertical land movements (VLM), the topographic features of the area provided by airborne Light Detection And Ranging (LiDAR) data and the Intergovernmental Panel on Climate Change (IPCC AR-5) projections of SLR in the Representative Concentration Pathways RCP2.6 and RCP8.5 emission scenarios. Our results show a diffuse land subsidence locally exceeding 9±2 mm/yr[1]. A variable RSLR between 0.62±0.12 m and 1.26±0.12 m is expected for 2100 AD in the RCP8.5 scenario. For this reference epoch, most of the investigated areas will be vulnerable to inundation in the next 80 years. A relevant concern is the protection of the historical city of Venice although the MOSE system has recently come into operation to

prevent the effects of high tides in the lagoon. The hazard implications for the population living along the shore should push land planners and decision-makers to take into account long-term SLR scenarios in the definition and prioritization of adaptive pathways for a climate-resilient management of the Venice lagoon.