Title:	Assesment of Coastal Subsidence and Inundation Risk due to Relative Sea Level Rise using MT-InSAR and Deep Learning Techniques over the Kerala Coast of India
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Abstract:	Due to the increasing sea level rise and shoreline sinking, major coastal towns worldwide face the risk of inundation from relative sea level changes [1]. Flooding has been a persis- tent issue in Kerala, a southern Indian state, for the past few decades due to heavy rainfall and the low elevation of the area. Large regions with a diversity of wildlife and people can be found along Kerala's 590 km of coastline which makes the region highly vulnerable to inundation risk of relative sea level rise. In this context, we used a VV polarization to examine Sentinel-1 data of European Space Agency (ESA) that was collected for tracking subsidence along the descending track (Path 63 and 165). Using the Small Baseline Subset (SBAS) based MT-InSAR technique, the entire Kerala is analyzed for Vertical Land Motion (VLM) [2]. A total of 1443 interferograms were obtained by co-registering and processing 326 single-look complex images. The results show that the Kuttanad region of Alappuzha and Cochin region of Ernakulam are having the maximum subsidence of >20 mm/year. The tide gauge station on Cochin Willingdon Island shows a 1.97±mm/year relative sea level trend. NASA's Intergovernmental Panel on Climate Change (IPCC) AR6 assessment has projected a future sea level shift of 0.71 meters by 2100, accounting for the socioeco- nomic scenario SSP3-7.0. Utilizing the high spatial resolution of the Copernicus Digital Elevation Model (DEM), the sea level projection data from the IPCC-AR6 report, and the InSAR-derived VLM, the low-lying, rapidly subsiding zones that are susceptible to future flood inundation due to relative sea level rise have been mapped for each of Kerala's four- teen districts. We have also incorporated a deep learning based U-net model to come up with an automated risk map by considering the hazard, vulnerability and the susceptibility of the region. A comparative analysis of the risk with and without considering Vertical Land Motion was done to know the effect of subsidence on inundation. For the low level scenario SSP 1-1.9, 4.53 to 14.82 % increase in the risk zone was observed when VLM was also included. And for the high level scenario SSP 5-8.5, this percentage change was found to be 4.71 to 9.94 %. This analysis will help policymakers take precautionary measures to mitigate future disasters due to relative sea level rise.
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