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IMPROVING THE ACCURACY AND ACTIONABILITY OF FLOOD RISK MODELS WITH EARTH OBSERVATION DATA

Abstract

By 2030, the population annually affected by coastal and riverine flooding is expected to double, reaching 147 million people with an estimated $712 billion in property impacted. A UN COP27 report revealed that climate-oriented developers ready to deploy capital struggle to secure investments. Simultaneously, however, financiers criticize a shortage of bankable projects. COP's new multilateral Loss and Damage Fund emphasized the importance of accurately quantifying climate risks on a global scale. Objective risk assessments are particularly important for developing nations, where impacts and damages, frequently a significant percentage of GDP, can vastly outweigh their own contributions to climate change. Current top-down flood impact and loss modeling methods face temporal resolution limitations inherent to costly and infrequent surveys. Additionally, models have generally lacked a ground-truth understanding of the land-cover characteristics implicit in their analyses, relying upon alternative low-resolution parameters to make statistical conclusions. New tools are therefore required to refine flood risk and loss models. These models are broadly broken into four components: 1. Hazard (flood inundation depth), 2. Exposure (land use type), 3. Value at Risk (land and property characteristics), and 4. Susceptibility of Elements at Risk (depth-damage curves) where uncertainty in each propagates through the model into a final financial estimate. With the support of the EuroSpaceHub Academy, this paper explores and quantifies the opportunity of an ensemble of novel techniques combining Earth observation data and machine learning to mitigate these uncertainties and derive actionable climate intelligence for key decision-makers. Finally, based on the enhancements above, this paper will propose novel applications for space-enabled services that can inform a more equitable approach to sustainable development, from disaster financing and insurance to investing in resilient infrastructure and nature-based solutions.