COLLABORATIVE FLOOD MODELING FOR INCLUSIVE AND TIME-EFFICIENT CLIMATE ADAPTATION

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Climate change is intensifying flood risks, but achieving flood adaptation that is both effective and equitable is extremely challenging. Flooding dynamics are complex and uncertain, decision-making is limited by sociopolitical and institutional constraints and power structures, and participatory processes are very time consuming. To date, neither the processes nor the outcomes of flood adaptation have delivered upon aspirations for environmental justice. It is reasonable to be skeptical that future investments in flood adaptation will offer greater benefits to underserved communities than past projects—or that they will sustain lasting benefits in a warming climate. To address the need for effective, time-efficient, and equitable flood adaptation, we present an innovative collaborative flood modeling platform consisting of a fast-response flood simulation engine and an equitable-access, participant-driven control mechanism. The platform is designed to support interactive and inclusive exploration of adaptation options and pathways at neighborhood to regional scales. The platform, which is being deployed and tested in Southeast Florida, fills a gap in flood simulation methods between regional modeling tools lacking detail required for adaptation planning and local-scale modeling tools impractical to apply at the metropolitan scale due to computational bottlenecks. Breakthrough simulation speeds are made possible by the Parallel Raster Inundation Model (PRIMo), which can be flexibly configured to explore relevant flood scenarios (e.g., combinations of rainfall and storm surge, across different time horizons, for extreme versus frequent events), and the responses desired by community stakeholders across geographical locations (e.g., infrastructural options, nonstructural adjustments, policy/management options). Performance metrics such as flood depth, frequency, and intensity can be measured with household-scale resolution across scenarios. Currently, pilot studies are under development in Miami-Dade County to quantitatively measure the benefits of the new platform such as increasing participation of underserved groups in flood adaptation planning, shortening planning timelines, and more equitably distributing benefits and costs of flood management measures across individuals and neighborhoods through time. Widespread adoption of the approach could help climate adaptation across the United States and beyond to be more time-sensitive, equitable, and cost-effective.

PRESENTER BIO: Katharine Mach is a professor at the University of Miami. Her research assesses climate change risks and response options to address increased flooding and other hazards. Through innovative approaches to integrating evidence, she informs effective, equitable adaptations to the risks. Mach was the 2020 recipient of the Piers Sellers Prize for world leading contribution to solution-focused climate research. Mach received her PhD from Stanford University and AB summa cum laude from Harvard College.