

SIMULATING WATER FLOWS FOR PREPARING AND PLANNING



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Rainfall-induced flooding is on the rise in our region. Our local extreme precipitation is increasing in magnitude, frequency, and duration according to the most recent National Climate Assessment that I helped peer-review for the National Academy of Sciences. The solutions must reflect the complexity of our built environment and meet the needs of the lives and livelihoods that thrive therein. Vitally, the data and technology solutions need to represent the non-linear feedbacks inherent in complex systems like ours where the sea and sky meet the urban landscape and patterns of life pulse across many time scales, from the daily commute to the seasonal shifts that make rain turn to snow. This necessitates anticipating the impacts across a continuum of timescales, from hours/days-long forecasts to months/years projections.

I believe we need a common integrated building-resolving modeling and data assimilation system that can span this timescale continuum. This system should encompass a high-fidelity representation of the water flows and their interaction with the buildings and storm drains. It should feature the way the ocean and rivers come together and interact in our crossroads of water currents that defines our region. It should include the ebb and flow of people and cars and bikes in our transportation corridors that creates the vitality of our cities. And it should show us how “green” interventions

like permeable surfaces and waterfront edge design can blunt the worst impacts of storms.

Crucially, the system should account for variable uncertainty – allowing for smaller uncertainty bounds as storm events approach, and increasing uncertainty as the time horizon lengthens to years and decades. Such an integrated system would allow us to collectively be responsive to individual rainfall events (preparedness), while expecting that each storm event we experience will not be the last or the worst (planning).

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These are among the elements of true resilience in the face of our climate crisis. And because such an integrated resilience project is a collective responsibility, it makes sense to collaborate across the public, academic and private sectors to build a dedicated flood forecasting system. This is an investment in our present and future. Let’s get there together.