

# IT'S NOT JUST THE RIVER THAT FLOODS



Developing compound flood maps to assess neighborhood-scale risk

## WHY NOW?

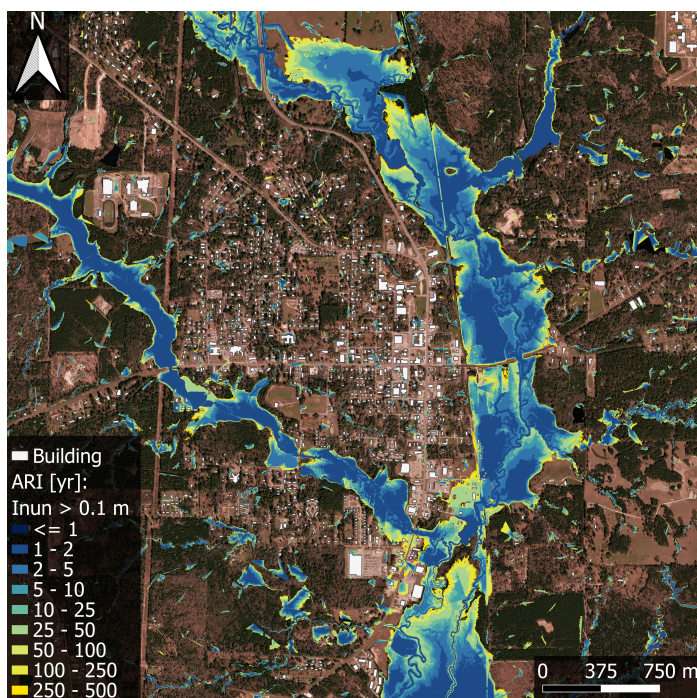
Flood maps are typically produced as boundaries that show where flooding is or is not expected during a weather event (e.g., a specific river flood). These "binary floodplain maps" do not accurately represent the conditions in Southeast Texas. For instance, flooding in Southeast Texas can result from multiple drivers (e.g. river flooding, coastal flooding, and intense rainfall) creating substantial uncertainty. Traditional binary floodplain maps do not communicate this uncertainty, limiting their usefulness for neighborhood-level planning, infrastructure design, and risk communication.

## WHAT WE DID

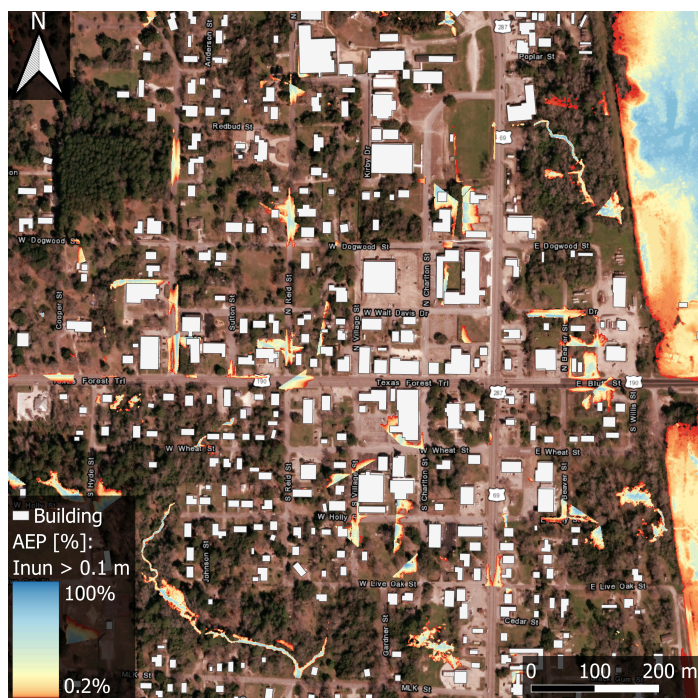
The SETx-UIFL developed a framework to produce probabilistic, high-resolution flooding and applied it to the Village Creek watershed in Southeast Texas. The research team simulated 5,000 storm events within the Advanced Terrestrial Simulator (ATS), a fully distributed hydrologic model. The research team then combined the flood results across the flood scenarios to estimate the probability of flooding across a 1 m-grid resolution.

## WHO WAS INVOLVED?

This work builds upon local knowledge about flooding-problem areas in the Village Creek watershed, which was selected due to its history of severe flooding and the presence of communities like Woodville, Ivanhoe, and Wildwood. The results have a fine enough resolution to support insights about block-level flooding (e.g., what is the probability of flooding at this driveway or at this structure)?



*Probabilistic 1 m resolution flood map for Woodville, TX. Pixels represent annual recurrence interval of inundation greater than 0.1.*

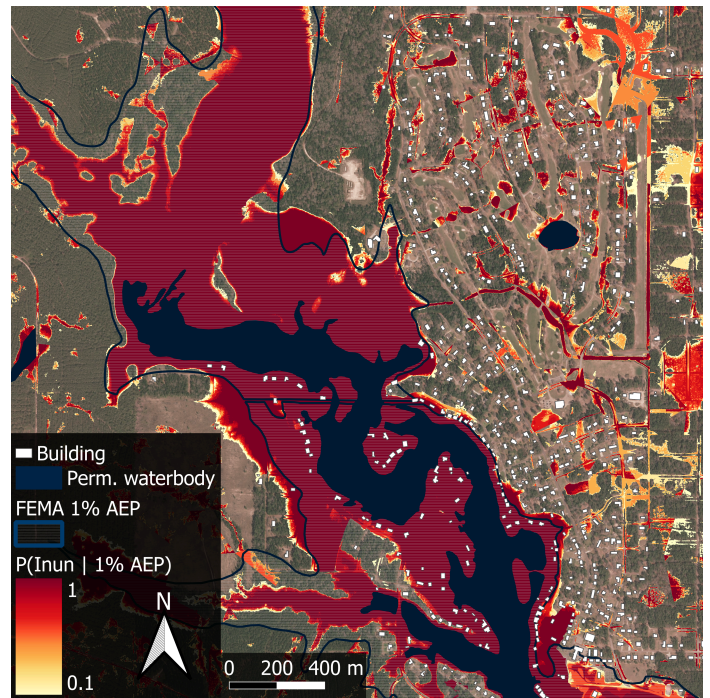


*Probabilistic 1 m resolution flood map for an area of Woodville, TX. Probability is represented as annual exceedance probability (%).*

## FINDINGS

Our results demonstrate that this approach to flood mapping provides informative representations of flood risk, with richer information than traditional maps.

- High-resolution compound risk: 1 m-grid maps reveal pluvial flooding near roads and buildings that is not captured by river floodplain maps.
- Pixel-wise probability: Aggregating flood event simulations allows estimation of varying flood probability at each 1 m-pixel.
- These results support neighborhood-scale planning and improved communication of compound flood hazard.



*Probability of inundation given a 1% annual exceedance probability (AEP, %) event in Wildwood, TX. The fine resolution highlights pluvial inundation outside of the floodplain along roads.*

## MORE ABOUT SETX-UIFL

The Southeast Texas Urban Integrated Field Lab (SETx-UIFL) is one of four projects funded in 2022 by the U.S. Department of Energy to study how climate, environment, and urban changes affect cities. A team of over 80 researchers from UT, Lamar University, Texas A&M, Prairie View A&M, Oak Ridge National Lab, and Los Alamos National Lab has collected data and conducted modeling across hazards including flooding, hurricanes, heat stress, and air quality. Our Why: Southeast Texas faces numerous hazards, yet smaller communities like this one have often felt forgotten compared to larger cities. The SETx-UIFL was designed to explore the complex dynamics of disaster vulnerability for this economically and culturally vibrant region. We believe Southeast Texas is a bellwether for the entire Gulf Coast, and an exemplar for strategies that protect people and places. We hope this effort supports your path toward lasting resilience.



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