EGU24-14082, updated on 20 May 2024
https://doi.org/10.5194/egusphere-egu24-14082
EGU General Assembly 2024

Translating Flood Insurance Claims in the Coastal CONUS within the Spectrum of Compound Flood Risk

Mahjabeen Fatema Mitu[1,2], Giulia Sofia[1,2], Xinyi Shen[3], and Emmanouil N. Anagnostou[1,2]
[1]Department of Civil & Environmental Engineering, University of Connecticut, Storrs, CT, United States of America
[2]Eversource Energy Center, University of Connecticut, Storrs, CT, United States of America
[3]School of Freshwater Sciences, University of Wisconsin-Milwaukee, Milwaukee, WI, United States of America

The intricate physical complexity of compound coastal flooding—resulting from the combination of river floods and storm surges—is known for often leading to more severe consequences than independent-driver floods. Damages from this type of flooding are expected to increase due to the impact of climate change on precipitation patterns and coastal storms, coupled with the increasing trends in population growth and economic activities along coastal regions. In the United States, the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP) is the largest provider of flood insurance policies, and currently, more than two million NFIP flood claim transactions (1978 to present) are available to the public for analysis. However, there is a lack of studies that analyze how compound events reflect on insurance claims.

In this study, we focus on over 60,000 counties across the entire coastline of the United States to provide an exhaustive analysis of the distribution of economic losses in areas subject to river flooding, coastal flooding, and regions susceptible to compound events.

To identify the relative importance of the driving mechanisms (inland vs. coastal flows) for a particular location, we apply a published index [D-Index, readers are referred to the article, https://doi.org/10.1016/j.jhydrol.2023.130278 for details] that is capable of physically attributing the cause of flood depth to either river or coastal drivers, or a combination of both rainfall and storm surge.

We focus the analysis on the number of damages reported in the claims, comparing and contrasting claims in counties physically labeled as coastal, river, or compound. By calculating the quantile weight distance (QWD) of the damages from claims in the 'compound' counties and claims in the 'independent-driver' counties, we further investigate how rainfall and tide characteristics of storm events relate to the NFIP flood claims in the case of compound events. We further quantify differences in QWD by comparing and contrasting FEMA's high-risk flood zones (identifying the 1-percent annual chance floodplain), where insurance is required for homes financed through federally backed or federally-regulated lenders, and FEMA's low and moderate-risk flood zones, where flood insurance is not required.

In conclusion, this study furnishes invaluable insights into the intricate challenges of assessing

compound coastal flooding impacts on insurance claims. The proposed methodology, integrating a flood type-specific mapping system and considering spatial variabilities of inundation characteristics, establishes a robust foundation for a comprehensive and improved flood risk assessment in coastal CONUS.

These findings empower coastal communities to proactively manage concealed risks and fortify their resilience against the compounding impacts of environmental forcings. This research offers a proactive and informed strategy to mitigate the potentially disastrous consequences of compound coastal flooding in a changing climate and socio-economic landscape.