

Title: StEER: Hurricane Helene Annotated Media Repository

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Abstract: Hurricane Helene made landfall as a Category 4 in the Big Bend region of Florida, near Perry, FL at approximately 0310 UTC September 27, 2024. The storm's intensity and northeastern track across the Gulf of Mexico produced coastal flooding along a large portion of Florida's Gulf Coast from Apalachee Bay to the north in the Big Bend, extending to just south of Naples. The most significant coastal flooding occurred in Florida's "Nature Coast" between Clearwater Beach and Apalachee Bay, and because much of this coastline is less developed than other parts of Florida's coast, potentially high economic losses were minimized there to some extent. Hurricane Helene's wind field was notably extensive, with hurricane force winds extending outward up to 60 miles but wind velocities at landfall were substantially lower than Category 4 strength and well below the design wind speed in this region. Like Hurricane Harvey, Helene generated a series of cascading hazards as it moved inland, with a wide range of impacts across several other states as it moved through the Southeastern United States and into Appalachia. Beyond spawning tornadoes across Georgia, South Carolina and North Carolina, Helene produced rainfall values exceeding 35 cm (14 in) in parts of Florida, Georgia, and South Carolina, with at least one location in North Carolina exceeding 78 cm. North Carolina, despite being hundreds of miles north of Hurricane Helene's landfall site, arguably experienced the most severe impacts. The extreme precipitation in the western part of North Carolina resulted in unprecedented flooding. As a result, Hurricane Helene will be one of the deadliest and costliest natural disasters in US history with over 230 reported fatalities and damage and economic losses possibly surpassing 160B USD, though estimates are still quite fluid, with expected sizable gaps between total losses and insured losses. While storm surge in excess of 10 feet caused significant damage to structures with insufficient freeboard, there were no significant wind losses in Helene. Instead, the vast majority of notable structural failures occurred well inland, emanating from an unprecedented intensity of rainfall, exacerbating a prior condition of heavily saturated soils and rivers at or near flood stage, leading to flash flooding, high-velocity flows, large debris fields, and widespread geotechnical failures that destroyed buildings, claimed lives, and cut entire regions of North Carolina off for extended periods of time. While there may be limited ability to engineer individual structures to resist such demands, it is important to document and learn from a disaster of this scale.

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