

New Jersey shore likely to confront unprecedented flooding

December 5 2013, by Ken Branson



The amusement pier at Seaside Heights, N.J., under attack by Hurricane Sandy. Credit: Master Sgt. Mark C. Olsen, New Jersey Air National Guard

(Phys.org) —Geoscientists at Rutgers and Tufts universities estimate that the New Jersey shore will likely experience a sea-level rise of about 1.5 feet by 2050 and of about 3.5 feet by 2100 – 11 to 15 inches higher than the average for sea-level rise globally over the century.

That would mean, the scientists say, that by the middle of the [century](#), the one-in-10 year flood level at Atlantic City would exceed any flood known there from the observational record, including Superstorm Sandy.

Ken Miller, Robert Kopp, Benjamin Horton and James Browning of Rutgers and Andrew Kemp of Tufts base their projections in part upon an analysis of historic and modern-day records of [sea-level](#) rise in the U.S. mid-Atlantic region. Their research appears in the inaugural issue of the journal *Earth's Future*, published this week by the American Geophysical Union. It builds upon a [recent study](#) by Kemp, Horton and others that reconstructed a 2,500-year record of sea level at the New Jersey shore. Horton is a professor of marine and coastal sciences in Rutgers' School of Environmental and Biological Sciences; Kemp, an assistant professor of earth and ocean sciences at Tufts.

"It's clear from both the tide gauge and geological records that sea level has been rising in the mid-Atlantic region at a foot per century as a result of global average [sea-level rise](#) and the solid earth's ongoing adjustment to the end of the last ice age," said Miller, a professor of earth and planetary sciences in Rutgers' School of Arts and Sciences. "In the sands of the New Jersey coastal plain, sea level is also rising by another four inches per century because of sediment compaction – due partly to natural forces and partly to groundwater withdrawal. But the rate of sea-level rise, globally and regionally, is increasing due to melting of ice sheets and the warming of the oceans."

Sea-level rise in the mid-Atlantic region also results from changes in ocean dynamics, the scientists said. "Most ocean models project that the Gulf Stream will weaken as a result of climate change – perhaps causing as much as a foot of additional regional sea-level rise over this century," said Kopp, an assistant professor of Earth and planetary sciences and associate director of the Rutgers Energy Institute.

The researchers said sea-level rise could be higher – 2.3 feet by mid-century and 5.9 feet by the end of the century – depending on how sensitive the Gulf Stream is to warming and how fast the ice sheets melt in response to that warming.

Either way, the researchers' study of past sea-level change also revealed that something remarkable started happening over the last century. It's not only temperatures that have been veering upward as a result of greenhouse gas emissions. "The geological sea-level records show that it's extremely likely that sea-level in New Jersey was rising faster in the 20th century than in any century in the last 4300 years," Kemp said.

The unprecedented 20th-century sea-level rise had a significant human impact. The study found that the eight inches of climate change-related regional sea-level rise in the 20th century exposed about 83,000 additional people in New Jersey and New York City to flooding during 2012's Superstorm Sandy.

Miller, Kopp, Horton and Browning are affiliated with the Rutgers Climate Institute, whose recent State of the Climate: New Jersey report surveyed the current and future impacts of climate change on the state.

More information: onlinelibrary.wiley.com/journal/10.1002/ISSN292328-4277

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