Millions of Americans at risk of flooding as sea levels rise

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Nearly four million Americans, occupying a combined area larger than the state of Maryland, find themselves at risk of severe flooding as sea levels rise in the coming century, new research suggests.

A new study, published today, 14 March, in IOP Publishing's journal *Environmental Research Letters*, asserts that around 32,000 km^2 of US land lies within one vertical meter of the high tide line, encompassing 2.1 million housing units where 3.9 million people live.

For this study, the researchers created a new model to identify the areas of US mainland that are at risk of flooding and, with a predicted sea level rise of 1 meter or more by the end of the century, suggest that the US Government's currently designated flood zones should not be considered stable.

A second study, also published today in Environmental Research Letters, corroborates evidence of the risk, showing that a majority of US locations, from the 55 studied, will see a substantially higher frequency of storm-driven high water levels by the middle of the century; water levels that have previously been encountered only once-a-century.

Many locations would be expected to experience such high flooding every decade or more often.

Two ways in which global warming is causing sea levels to rise are thermal expansion – the expanding of water as it warms – and the

melting of glaciers.

The first study, undertaken by researchers at Climate Central and the University of Arizona, shows that at a state level, areas surrounding the Gulf appear to be the most vulnerable, whilst in terms of population, Florida is the most vulnerable, closely followed by Louisiana, California, New York and New Jersey, illustrating significant exposure on every coast.

The researchers pick out greater Los Angeles as a largely-populated city of great concern, as previous research suggests that flooding may reach rare heights more swiftly in southern California than in any other mainland US area.

The second study examined the effect of heavy storms on past water levels at 55 stations across the US and combined these with estimates of future global sea level rises to predict the frequency and extent of future flooding.

The researchers, from Climate Central, the National Center for Atmospheric Research and the National Oceanic and Atmospheric Administration, liken the type of annual flooding that we may come to expect to the infamous high water levels brought about in New York in 1992, which managed to flood the subway system, as a result of a violent nor'easter (a storm coming in off the Atlantic).

Co-author of both papers, Ben Strauss, researcher at Climate Central, said: "The sea level rise taking place right now is quickly making extreme coastal floods more common, increasing risk for millions of people where they live and work. Sea level rise makes every single coastal storm flood higher. With so many communities concentrated on US coasts, the odds for major damage get bigger every year."

More information: The published version of the paper 'Modelling sea level rise impacts on storm surges along US coasts' (Claudia Tebaldi, Benjamin H Strauss and Chris E Zervas 2012 *Environ. Res. Lett.* 7 014032) will be freely available online from 14 March. It will be available at iopscience.iop.org/1748-9326/7/1/014032/article

The published version of the paper 'Tidally adjusted estimates of topographic vulnerability to sea-level rise and flooding for the contiguous United States' (Benjamin H Strauss, Remik Ziemlinski, Jeremy L Weiss and Jonathan T Overpeck 2012 *Environ. Res. Lett*. 7 014033) will be freely available online from 14 March. It will be available at iopscience.iop.org/1748-9326/7/1/014033/article

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