

'Funneling' behind severe flooding on the Clyde

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A "funneling" effect has been a major factor in severe flooding on the River Clyde in recent years, according to a study by mathematicians at the University of Strathclyde.

The researchers produced a modelling programme to simulate surges in the river's waters which played a role in floods in recent years, including the [hurricane](#) which swept Scotland in December 2011.

The results are the fullest analysis so far of surge waves in the Clyde and could be used to forecast future extreme weather.

Professor Mike Heath, of Strathclyde's Department of Mathematics & Statistics, was a partner in the research. He said: "Storm surges are an abnormal increase of water levels in response to disruptive weather. They have the capacity to cause damaging flooding in coastal areas, especially when they coincide with high spring tides.

"The location and physical layout of the Firth of Clyde make it an area with high flooding risk. In this research, we used a three-dimensional hydrodynamic model to simulate surges in the Clyde during storms; our findings suggest that floods are caused not only by extreme surges but also by moderate surges coupled with high spring tides.

"The water level is also enhanced by a 'funneling' [effect](#), which is linked to the depth of the river's floor and the complexity of the Clyde's sea coastline. Our findings suggested that the areas of the Clyde most

exposed to severe surges were its firth and areas which resemble fjords.

"The storms with the highest water levels usually followed a particular pattern, with low pressure from the Atlantic moving to the north of mainland Scotland or further north. Regions such as the bay areas of the west coast in the US are usually protected from surges from outside but their basins are larger than that of the Clyde and their channels to the ocean are narrower."

The study examined three storm surge incidents in December 2011 – on the 13th and 28th of the month and a particularly severe storm on the 8th-9th of the month.

More information: Alessandro D. Sabatino et al. Modelling sea level surges in the Firth of Clyde, a fjordic embayment in south-west Scotland, *Natural Hazards* (2016). [DOI: 10.1007/s11069-016-2506-7](https://doi.org/10.1007/s11069-016-2506-7)

Provided by University of Strathclyde, Glasgow

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