Most U.K. coastal flooding caused by moderate, not extreme storms

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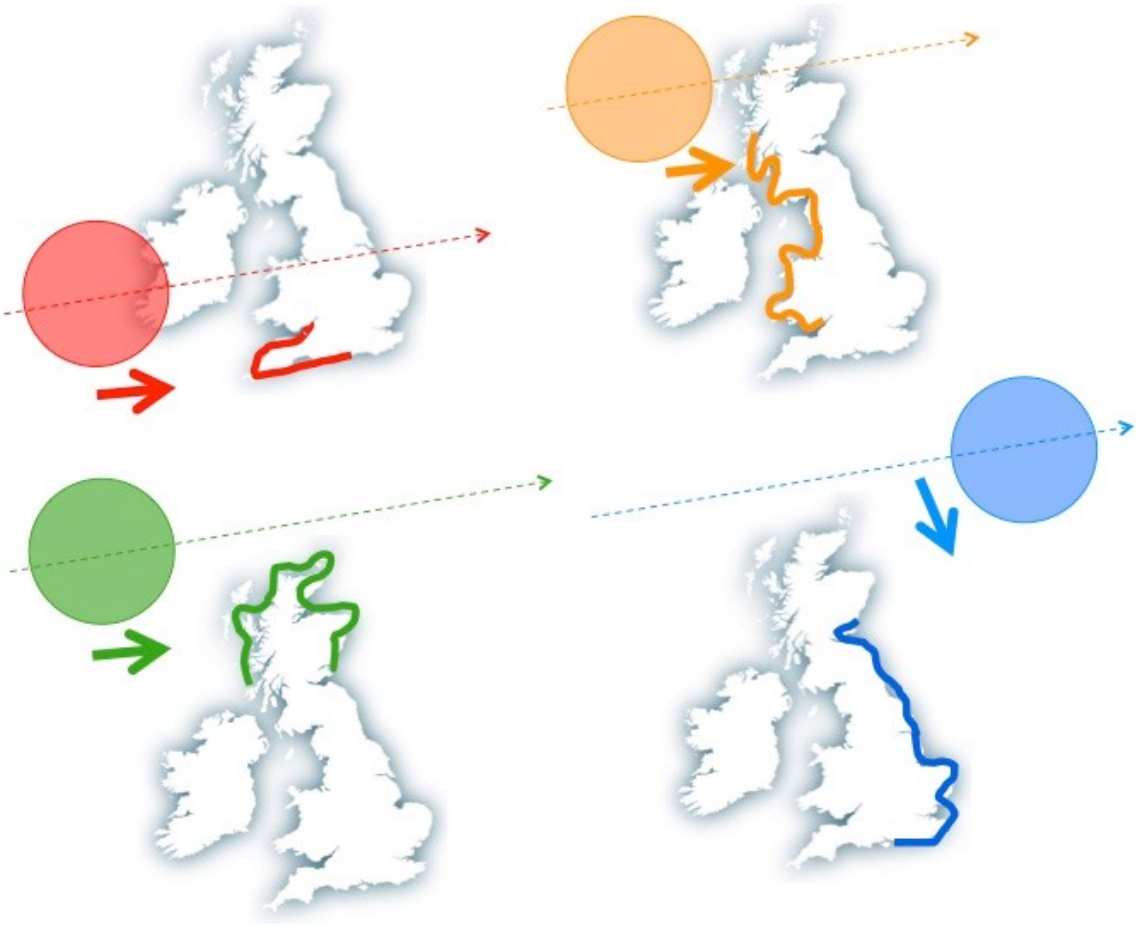

Graphic showing four broad footprints of sea level events and position and tracks of storms and associated winds (arrows). Credit: University of Southampton

Scientists at the University of Southampton have found that the majority of instances of coastal flooding around the United Kingdom in the last 100 years have been due to moderate storm events combined with high spring tides, rather than extreme storms.

Researchers from the University and the National Oceanography Centre, Southampton have undertaken one of the most detailed assessments of extreme sea level and coastal flooding ever carried out for the U.K.. Their findings are published in *Nature* Research journal *Scientific Data*.

The team examined exceptionally high sea levels using tide gauge records dating from 1915 to 2014. In particular, they set out to assess the footprint of flooding along the U.K. coast. This helped them to determine what types of storms led to simultaneous flooding along extended stretches of coastline during the same storm and to examine the temporal 'clustering' of the flooding events, i.e. events occurring one after another in close succession.

Lead author, Associate Professor Ivan Haigh of Ocean and Earth Science at the University of Southampton says: "We found that most of the extreme storms and storm surges have, by chance, not occurred on high spring tides and hence haven't led to flooding. The majority of instances of coastal flooding have been due to more moderate storm events. It is important that we improve our understanding and prediction of moderate storms, examine how these might change in the future with climate change, and not only focus our attention on extreme events."

The researchers also identified four main storm track pathways approaching the U.K. (mainly from the westerly and northerly directions) and four broad corresponding footprints of extreme sea level events (four sections, which together, make up most of Britain's mainland coastline).1

"The stretch of coast impacted is very much determined by the pathway the storm takes," explains Dr Thomas Wahl, a Research Fellow at the University of Southampton. "Importantly, we identified there have been occasional events, when extreme levels have occurred along large lengths of coast and even along two unconnected stretches of coastlines during the same event."

In addition, the study considered how unusual the 2013-14 winter season was from a coastal flooding perspective - a period when the U.K. experienced a remarkable sequence of extreme storms and coastal floods. Dr Jenny Brown, from the National Oceanography Centre, concludes: "We found that storms during winter 2013-14 generated the maximum-recorded sea level at 20 of the 40 tide gauge sites around England, Wales and Scotland; and the largest number of extreme sea level events in any season in the last 100 years."

Robert Nicholls, Professor of Coastal Engineering at the University of Southampton, added: "Clustering of storms, such as happened during the 2013-14, or even 2015-16 season, is an important issue. It can lead to large socioeconomic impacts and cumulative insurance losses. Before now, knowledge of this area has been limited, but our study will help better inform flood management, the insurance sector, and national emergency and infrastructure resilience planning to minimise the impact of successive storm events. For example, knowledge of typical lengths of time between storm events will help determine how much time emergency response teams have to repair a flood defence before the following storm arrives."

More information: Ivan D. Haigh et al. Spatial and temporal analysis of extreme sea level and storm surge events around the coastline of the UK, *Scientific Data* (2016). DOI: 10.1038/sdata.2016.107

Provided by University of Southampton