European Commission

Science for Environment Policy

Atlantic beaches of Europe reshaped in stormy winter of 2013–2014

Waves hitting Europe's Atlantic coast during the winter of 2013–2014 were the most powerful in nearly 70 years, reports a new study. They caused significant coastal erosion and the study found examples of beaches which are now several metres lower. The study's authors say that coastal planners should consider increasingly stormy conditions in the north-east Atlantic, as predicted by some climate change models.

The winter of 2013–2014 was exceptionally stormy in western Europe — the stormiest on record for the southern part of Ireland, south-west England and the west coast of France. Erosion was observed in many coastal locations: in the south-west of the UK, for instance, sand was completely washed away from many beaches, exposing the rocky layer beneath. Nearly all sites with sand dunes were eroded, creating scarps (steep, almost cliff-like slopes) which were often over 10 metres high.

This study, conducted by researchers in France, Northern Ireland and the UK, investigated the effects and rarity of the stormy Atlantic conditions of 2013–2014. The project team quantified storm-wave activity and coastal impacts in western Europe in the following ways:

- A well-established computer model simulated the effects of wind in the North Atlantic, for an area stretching from Morocco up to the north of the UK, to produce a picture of wave activity for 1948–2015. The model results were validated using wave analysis from a number of offshore wave buoys.
- Six inshore wave buoys in coastal areas of France, Spain and the UK provided data for 2009–2015 on wave height and the amount of energy transported by waves.
- Data from monthly observations taken at six beaches in France and the UK since 2007 or earlier (depending on the beach), were analysed to understand the changing shape of the beaches.

The model suggested that the waves from the Atlantic during winter 2013–2014 were the most energetic to hit Europe since 1948. They were, on average, 40% higher than the average for the whole 1948–2015 timespan. The largest average 'significant' wave height during winter 2013–2014 was 5–6 m and occurred off the coast of Brittany (France), the south of Ireland and south-west UK. Significant waves are defined as those which are in the top third of all waves, in terms of height, over a given period.

The inshore wave buoys supported the modelling data, although over a much shorter period. They showed that significant waves and energy flux were higher during the winter of 2013–2014 than any other winter during 2009–2015.

The intense waves of the 2013–2014 winter had some major impacts on the beaches studied. For instance, on Vougot and Truc Vert (France), the coastal dunes were cut back by more than 10 m. On the most exposed beaches, Perranporth (UK) and Truc Vert, over 200 cubic metres of sand per metre (m^3/m) width of the beach was washed out to sea. Some sand re-accumulated on these two beaches between 2014 and 2015, at a rate of 50 m^3/m. However, in the specific case of Truc Vert, due to the very significant damage to the coastal dune system, natural recovery is expected to take over 10 years.

Continued on next page.

10 June 2016
Issue 458
Subscribe to free weekly News Alert

Source: Masselink, G., Castelle, B., Scott, T., Dodet, G., Suanez, S., Jackson, D. & Floc'h, F. (2016). Extreme wave activity during 2013/2014 winter and morphological impacts along the Atlantic coast of Europe. *Geophysical Research Letters* 43(5): 2135–2143. DOI:10.1002/2015GL067492. This study is free to view at: http://onlinelibrary.wiley.com/doi/10.1002/2015GL067492/full

Contact: g.masselink@plymouth.ac.uk

Read more about: Climate change and energy, Marine ecosystems

European Commission

Science for Environment Policy

Atlantic beaches of Europe reshaped in stormy winter of 2013/2014 *(continued)*

10 June 2016
Issue 458
Subscribe to free weekly News Alert

The middle section of Slapton Sands (UK) lost 100 m^3/m of sand, but this was deposited on the northern part of the beach, which grew wider as a result. This beach has not shown signs of recovery since. The researchers, therefore, highlight the site-specific impacts of extreme Atlantic waves.

These results are in line with predictions made by most climate change models, which indicate that the north-east Atlantic is becoming stormier. It would be difficult to show that the winter 2013–2014 conditions were definitely caused by climate change, but several other studies have shown that the Atlantic has become stormier over recent decades. Under a scenario of sea-level rise, the effects of a storm comparable to the 2013–2014 conditions will be increasingly severe. If the 2013–2014 conditions become more common in the future, the Atlantic coastline of Europe may change considerably. Increased storminess should, therefore, be considered in future coastal planning, the researchers recommend.

Source: Masselink, G., Castelle, B., Scott, T., Dodet, G., Suanez, S., Jackson, D. & Floc'h, F. (2016). Extreme wave activity during 2013/2014 winter and morphological impacts along the Atlantic coast of Europe. *Geophysical Research Letters* 43(5): 2135–2143. DOI:10.1002/2015GL067492. This study is free to view at: http://onlinelibrary.wiley.com/doi/10.1002/2015GL067492/full

Contact:
g.masselink@plymouth.ac.uk

Read more about:
Climate change, Marine ecosystems