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Large Scale Drivers for the Extreme Storm Season over the North Atlantic and the UK in Winter 2013-14

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The British Isles experienced exceptional stormy and rainy weather conditions in winter 2013-2014 while large parts of central North America recorded near record minimum surface temperatures values. Potential drivers for these cold conditions include increasingly warm surface waters of the tropical west Pacific. It has been suggested these increasing sea surface temperatures could also be the cause for extreme weather over the Europe, particularly the UK.

Testing this hypothesis, we investigate mechanisms linking the tropical west Pacific and European wind storm activity. We will firstly analyse anomaly patterns along such a potential link in winter 2013-14. Secondly, we will investigate whether these identified anomaly patterns show a strong interannual relationship in the recent past.

Our results, using primarily ERA-Interim Reanalysis from 1979 to 2014, show an absolute maximum of wind storm frequency over the northeast Atlantic and the British Isles in winter 2013-14. We also find absolute minimum surface temperatures in central North America and increased convective activity over the tropical west Pacific in the same season. The winter 2013-14 was additionally characterized by anomalous warm sea surface temperatures over the subtropical northwest Atlantic.

Although the interannual variability of wind storms in the northeast Atlantic and surface temperatures in North America are significantly anti-correlated, we cannot directly relate wind storm frequency with tropical west Pacific anomalies. We thus conclude that the conditions over the Pacific in winter 2013-14 were favourable but not sufficient to explain the record number of wind storms in this season. Instead, we suggest that warm north Atlantic sea surface temperature anomalies in combination with cold surface temperatures over North America played a more important role for generating higher wind storm counts over the northeast Atlantic and the UK.