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Observations relating extreme multi-basin river flows to very severe gales [Abstract]

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Observations relating extreme multi-basin river flows to very severe gales

John Hillier (1), Paolo De Luca (1), Rob Wilby (1), Nevil Quinn (2), and Shaun Harrigan (3)

(1) Loughborough University, Department of Geography, Loughborough, Leicestershire, United Kingdom (j.hillier@lboro.ac.uk), (2) Department of Geography and Environmental Management, University of the West of England, Bristol, UK., (3) Centre for Ecology and Hydrology (CEH), Wallingford, UK.

Fluvial floods are typically investigated as ‘events’ at the single basin scale. However, applying a recently developed methodology to identify the largest multi-basin peak flow events allows a statistically significant relationship between them and episodes of very severe gales (VSG) to be identified; such a systematic link has previously only very tentatively been proposed for extra-tropical cyclone seasons, where damaging wind and rain are commonly non-synchronous. Annual maximum river peak flow (AMAX) data during 1975-2014 for 261 non-nested catchments (i.e. with no other sites upstream) in Great Britain are used, and a 13-day window is selected. A simple correlation between metrics that are proxies for damaging wind and flooding is statistically significant ($r = 0.41$, $p = 0.0088$). Also, taking the most severe 50% and 30% of years for wind and flow respectively, co-occurrence is expected 6.6 times in 40 years whilst 10 are observed ($p = 0.021$; simulation with $n = 10,000$), making co-occurrence of the extremes 52% more likely than expected by chance. This has implications for emergency response and financial planning (e.g. insurance).