



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

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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).