



Fluctuations in autumn-winter severe storms over the United Kingdom: 1920 to present

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Extreme pressure changes over the United Kingdom during boreal autumn and winter have been analysed since 1920 using newly digitised 3-hourly station data. This work, building on the study by Alexander *et al.* (2005) that analysed similar data since the late 1950s, was undertaken to examine the variability and trends in severe storms over the United Kingdom during the last 85 years.

The previous study of the 50-year storm dataset detected an increase in the number of severe storms in the 1990s, and an overall increasing trend in storminess. With the addition of 40 years of data, the current analysis reveals a period of extremely large storm activity during autumn-winter (October-December [OND] and January-March [JFM]) in the 1920s. Thus, when examined over the last 85 years, storminess across the United Kingdom is most prominent in the 1920s and 1990s, with the former showing the greater level of activity. This result indicates that climatic variability plays an important role in modulating severe storms over the United Kingdom during autumn-winter.

An examination of the physical mechanisms underlying OND and JFM severe storms reveals that North Atlantic Oscillation (NAO) influences predominate in JFM, with tropical to midlatitude North Atlantic influences occurring during OND. In JFM, severe storms across the United Kingdom are significantly correlated with both the NAO pattern in mean sea level pressure (MSLP) and the 'tripolar' sea surface temperature (SST) structure over the North Atlantic. In OND severe storms are associated with a Rossby-like wave train in MSLP (and in 500 hPa geopotential height) from the tropical Atlantic to higher latitudes of the North Atlantic, and a distinct mono-polar

mid-Atlantic SST anomaly.