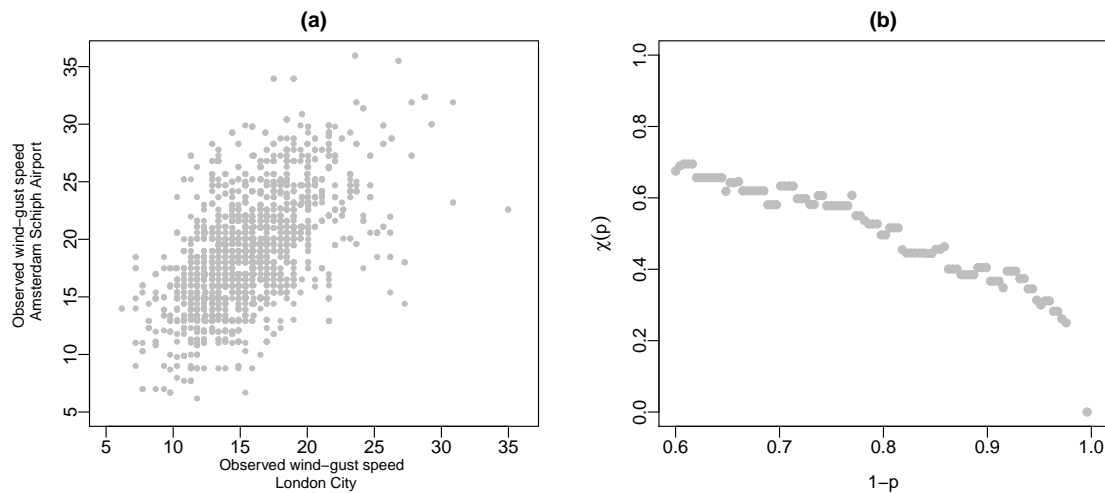


# Supplementary Material for: Quantification of extremal dependence in spatial natural hazard footprints: independence of windstorm gust speeds and its impact on aggregate losses

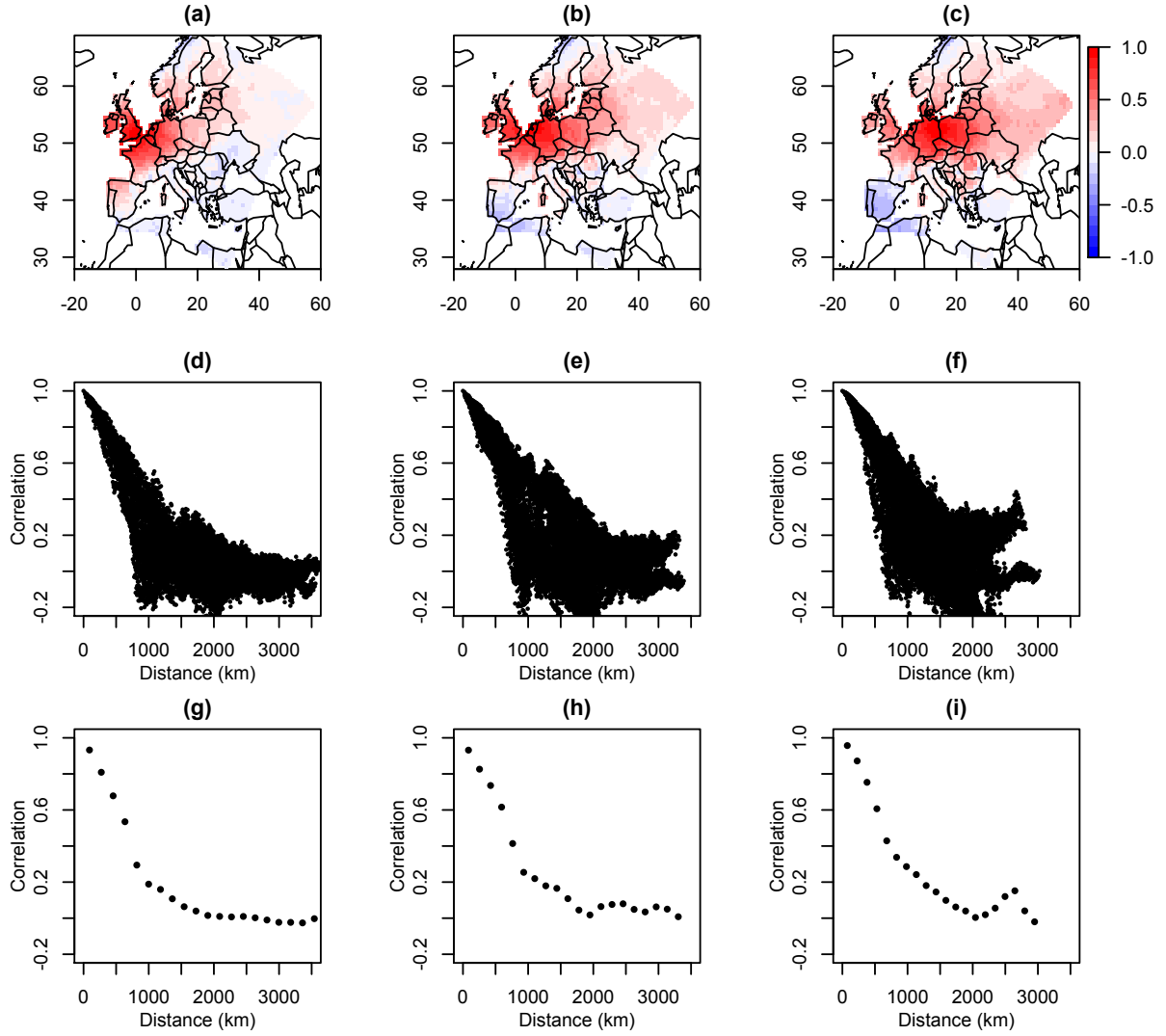
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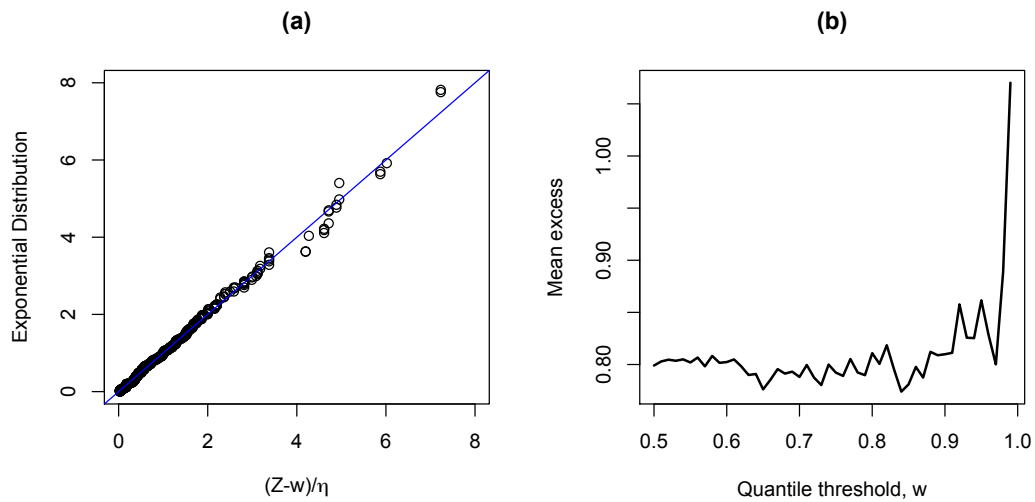
*Correspondence to:* Laura C. Dawkins (l.c.dawkins@exeter.ac.uk)



**Figure S1.** (a) Scatter plot comparing observed windstorm footprint wind gust speeds ( $\text{ms}^{-1}$ ) at London City and Amsterdam Schiphol Airport GSOD weather stations, (b) extremal dependence measure  $\chi(p)$ , for  $p \in [0, 0.4]$ , for observed windstorm footprint wind gust speeds at London City GSOD weather station paired with Amsterdam Schiphol Airport GSOD weather station.

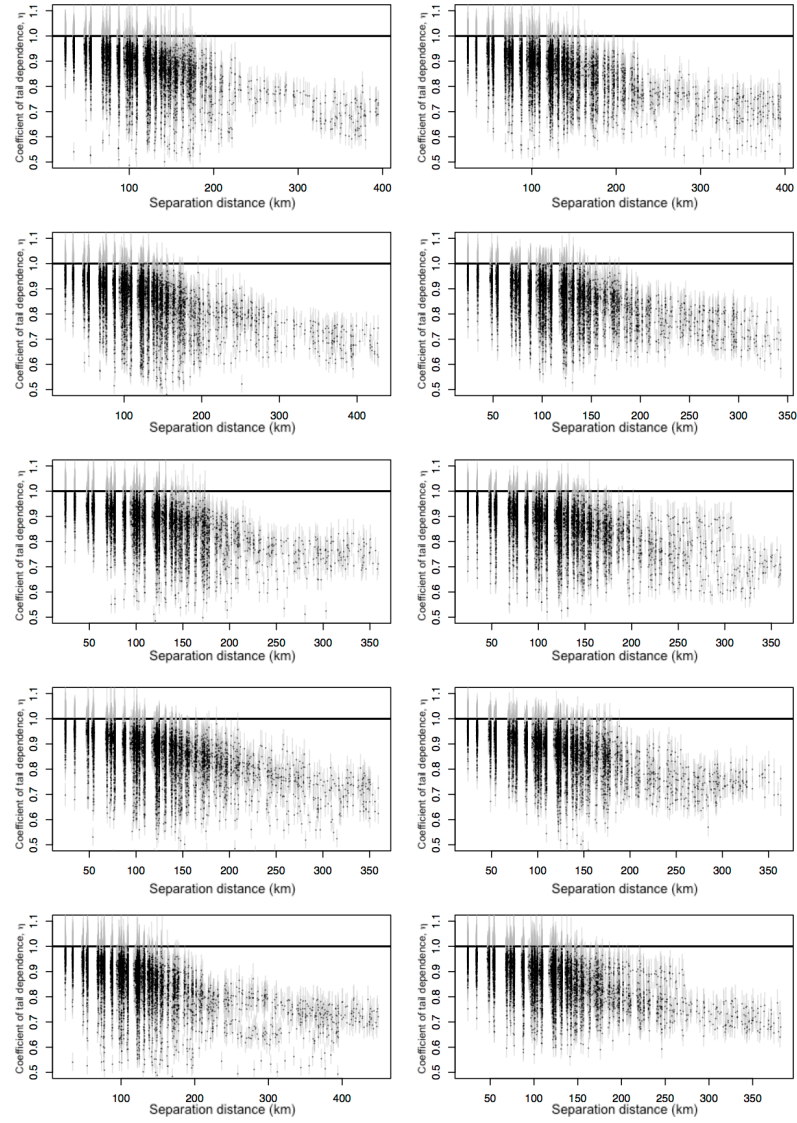


**Figure S2.** Empirical correlation between (a) London, (b) Amsterdam and (c) Berlin and all other land locations over land, plotted against distance in (d), (e) and (f) respectively and for distance binned average correlation in (g), (h), (i) respectively.

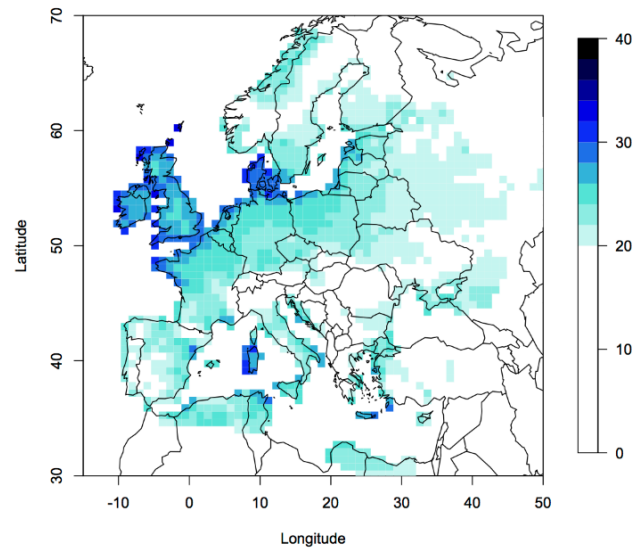


**Figure S3.** Threshold selection diagnostic plots for the Ledford and Tawn (1996) model: (a) Quantile-Quantile plot comparing the transformed excesses,  $(Z-w)/\eta$ , with the Exponential distribution (with rate parameter equal to 1), where  $w$  is the selected 0.85% quantile of the structure variable  $T$ , (b) stability plot for the mean excess as a function of threshold  $w$ .

Ledford, A. W. and Tawn, J. A. (1996). Statistics for near independence in multivariate extreme values. *Biometrika*, 83(1) : 169 – 187.



**Figure S4.** For 10 stratified samples of 100 locations within the European domain: the coefficient of tail dependence (estimated using  $w$  as the 0.9 quantile threshold of the structure variable) and 95% profile likelihood confidence intervals, for each of the 100 sampled locations paired with their 100 nearest locations in the full domain, plotted against separation distance in kilometres.



**Figure S5.** The 99% quantile of windstorm footprint wind gust speeds ( $\text{ms}^{-1}$ ) at land locations in Europe, used as the threshold above which windstorm conceptual insured losses occur.