

Speaker: Ben Youngman (University of Exeter)

Date: 14/11/2025 at 13:15 in 4 West 1.7 (Wolfson Lecture Theatre)

Title: High-resolution estimation of future extreme rainfall over the UK

Abstract:

The return level remains one of the most heavily reported results of an extreme value analysis. It is typically defined in terms of a very extreme quantile, such as the 99th percentile of the distribution of annual maxima. Return levels are useful for environmental data as a measure of risk that can be conveyed to non-specialists in a relatively straightforward way. This study considers risk estimates for extreme rainfall in the UK based on 2.2km gridded rainfall data, which are the highest resolution UK-wide rainfall data currently available. We model these data with extreme value distributions with parameters distributed as Gaussian Markov random fields (GMRF). Our motivation is to consider the GMRF as a comparatively assumption-free smoother, whereas other smoothing approaches, such as generalized additive models, typically require that we assume relationships with covariates (albeit semi-parametrically) to capture parameter variation. We find, though, that features of the data require that various extensions of standard GMRF models are needed to give robust return level estimates. We present risk estimates for extreme rainfall for the UK, in particular quantifying changes between 1980 and 2080.