



THE UNIVERSITY OF CHICAGO

Department of Statistics

MASTER'S THESIS PRESENTATION

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Modelling Daily Temperature Extremes: A Preprocessing Approach

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Jones 304, 5747 S. Ellis Avenue

ABSTRACT

Temperature extremes affect human health, infrastructure and environment. Extreme temperature can be particularly impactful on yield of some crops when occurring in specific growing season. This work is concerned with explicitly modelling marginal temperature extremes for each day within a year. Usually extreme temperature is modelled with extreme value theory (EVT) where seasonality is incorporated in parameters of generalized extreme value (GEV) distribution. This maybe inadequate when available data is limited. We introduce a preprocessing method where temperature is preprocessed with relatively high quantiles before EVT is applied to extreme values. The 2-step pre-processing method is applied to the last 1000 years of output from a general circulation model (GCM) under pre-industrial conditions at 133 gridded locations across the United States. We found the 2-step pre-processing method outperforms existing approaches in terms of estimating 100-year return level for each day when each dataset is of 40-years. Using a stationary model after the pre-processing gives small bias and RMSE, which suggests the relative high quantiles capture most non-stationarity in the tails of the distributions.

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