



A novel method to test for significant trends in extreme values in serially dependent time series

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We propose a novel method to investigate the statistical significance of trends of extreme values in serially correlated time series based on quantile regression and surrogate data. This method has the advantage over traditional extreme value methods that it takes into account all data points from the time series. We test this method on a temperature time series from the Antarctic Peninsula (Faraday/Vernadsky station) which is highly non-Gaussian and serially correlated. We find evidence for a significant upward nonlinear trend in the extreme cold temperatures (95th percentile) and that most of the observed warming at Faraday/Vernadsky is due to a reduction in cold extremes. Quantile regression can also be used for multivariate regression with external factors. This multivariate regression analysis provides evidence that CO₂ emissions play a large role in the observed trend at Faraday/Vernadsky while also the ozone hole and solar fluctuations play some role.