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Statistical modelling of high wind speeds

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Winds speeds in extra tropical latitudes are known to be approximately Weibull distributed. Hence a Weibull distribution fitted to all available data is often used to predict extreme winds. Observed extreme winds then, however, have little influence on the estimated parent distribution , and the accuracy of the extreme value predictions obtained in this manner may be questioned. In the first part of this talk we compare this "Weibull Method" to method based on statistical extreme value theory, "the Annual Maxima Method". The comparison is based on 30 years of 10 minute wind speed averages at 12 meteorological stations located at airports in Sweden. Results include that the Weibull method gave incorrect estimates of the distribuion of yearly maximum wind speeds, that it didn't provide any confidence bounds for the estimate, and that serial dependence of individual measurements has to be taken into account. The annual maxima method avoids these problems. In a second part of the talk we present a new class of extreme value mixture models. This class so far is relatively unexplored but, in our opinion, has substantial potential to catch much of the spatial and temporal dependence which is present in maximum wind measurements.