



A Statistical Approach for Wind Gust Estimation

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Wind gust estimation (WGE) is important both in numerical weather prediction (NWP) and loss estimation. Atmospheric models generally underestimate wind speeds, because the predicted wind components are grid box averages. Methods to estimate gusts from predicted wind speed comprise simple methods with a constant gust factor, gust factors considering local topographic characteristics (like roughness length and orographic variability) and methods taking account of the turbulence state of the boundary layer. In this study, standard WGE methods are compared with respect to their forecast quality in the German Weather Services (DWD) regional NWP model COSMO. Based on findings from examination of observed hourly wind gusts at 38 stations in Germany and model simulations for 158 historical wind storms in the period 1972-2008, a method is developed which (1) takes local effects like orographic variability into account and (2) includes the preservation of statistical characteristics of distributions of wind gusts by predicting quantiles of the wind gusts probability density function.