P49 A simple yet effective wind gust forecast parameterization

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Due to its chaotic nature and lack of adequate knowledge of its formation and behavior, it remains a day-to-day challenge to accurately predict wind gust speed, especially in the mountainous regions. Since mesoscale models are incapable of directly simulating gusts, empirical and heuristic attempts have been made to estimate wind gusts by multiplying the resolved-scale sustained wind speed by a gust factor (a gust-to-wind ratio) empirically determined from available observations (e.g. Mitsuta and Tsukamoto 1989), by employing surface layer wind shear (friction velocity) information (e.g., Panofsky et al. 1977; Beljaars 1987), or through assuming a normal distribution of wind fluctuations (e.g., Wieringa 1973).

Averaged over the entire San Diego Gas and Electric (SDG&E) mesonet, a homogenous, well-sited, and high-resolution network with uniform high quality, and over a 12-month period, we found the observed gust factor to be nearly constant with a value close to 1.7 and virtually no dispersion. The situation is shown to be similar for the Dugway Proving Ground (DPG) stations, another mesonet within complex topography, except that the network-averaged gust factor is closer to 1.35 instead. High-resolution WRF simulations have been made for both areas, and validated against mesonet observations. We hypothesize that stations that deviate the most from the network-averaged gust factor are most likely to be handled poorly by the model. This would motivate a simple yet effective gust parameterization that will be compared to operational methods currently being used at NCEP and ECMWF.