



Wind extremes and scales: multifractal insights and empirical evidence

D. Schertzer (1,2), I. Tchiguirinskaia (2), S. Lovejoy (3), J. M. Veysseire (1)

(1) Meteo-France, France, (2) ENPC, France, (3) McGill University, Canada

An accurate assessment of wind extremes at various space-time scales (e. g. gusts, tempests, etc.) is of prime importance for a safe and efficient wind energy management. This is particularly true for turbine design and operation, as well as estimates of wind potential estimates and wind farm implementation. We discuss the consequences of the multifractal behaviour of the wind field over a wide range of space-time scales, in particular the fact that its probability tail is apparently a power-law and hence much “fat-ter” than usually assumed. Extremes are therefore much more frequent than predicted from classical thin tailed probabilities. Storm data at various time scales are used to examine the relevance and limits of the classical theory of extreme values, as well as the prevalence of power-law probability tails.