Geophysical Research Abstracts
Vol. 19, EGU2017-16277, 2017
EGU General Assembly 2017

Multifractal evaluation of the COSMO NWP model

Daniel Wolfensberger (1), Auguste Gires (2), Ioulia Tchiguirinskaia (2), Daniel Schertzer (2), and Alexis Berne (1)

(1) LTE, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, (2) HMCO, Ecole des Ponts, UPE, Champs-sur-Marne, France

Universal multifractals allow to characterize the spatio-temporal variability of spatial phenomena over a wide range of scales witha limited number of scale-invariant parameters. In this work, we perform a multifractal analysis of simulations obtained from the COSMO numerical weather prediction model during three events (one cold front associated with heavy snowfall, one stationary front with stratiform rain and one summer convection event).

The first part of the study focuses on the multifractal analysis of water contents in liquid, solid and gas phase and the effect of altitude and topography. The second part of the study focuses on the comparison of the multifractal properties of simulated precipitation intensities at the ground with the QPE product obtained from the Swiss radar composite.

The results of this study show that the COSMO simulated water contents are generally strongly non-conservative and for some synoptic conditions show clear spatial scaling breaks. Similarly, in terms of precipitation intensities, COSMO simulations exhibit spatial scaling breaks that are not present on the radar data, indicating that the model is not able to simulate the observed variability at all ranges. Additionally,the spatial and temporal multifractal parameters of the COSMO simulations and the radar composite are shown to not agree well with a simplified spatio-temporal model.