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# Orographic Signature on Multiscale Statistics of Extreme Rainfall: Conditional downscaling with emphasis on extremes

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Rainfall intensity and spatio[U+2010]temporal patterns often show a strong dependency on the underlying terrain. The main objective of this work is to study the statistical signature imprinted by orography on the spatial structure of rainfall and its temporal evolution at multiple scales, with the aim to develop a consistent theoretical basis for conditional
downscaling of precipitation given the topographic information of the underlying terrain. The results of an extensive analysis of the high resolution stage II Doppler radar data of the Rapidan storm, June 1995, over the Appalachian Mountains is reported in this study. The orographic signature on the elementary statistical structure of the precipitation fields is studied via a variable[U+2010]intensity thresholding scheme. This signature is further explored at multiple scales via analysis of the dependence of precipitation fields on the underlying terrain both in Fourier and Wavelet domains. The Generalized Normal distribution is found to be a suitable probability model to explain the variability of the rainfall wavelet coefficients and its dependence on the underlying elevations. These results provide a new perspective for more accurate statistical downscaling of the orographic precipitation over complex terrain with emphasis on extremes.