Geophysical Research Abstracts, Vol. 9, 06148, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-06148

Seasonal and regional variability in scaling properties and correlation structure of high resolution precipitation data in a highly heterogeneous mountain environment

P. Molnar and **P. Burlando**

Institute of Environmental Engineering, ETH Zurich, CH-8093 Zurich, Switzerland
(molnar@ifu.baug.ethz.ch, paolo.burlando@ethz.ch)

Stochastic precipitation models (point-process or scaling-based) are generally calibrated on statistical properties of precipitation observed at different temporal resolutions. Often there are insufficient station data to explore the spatial variability in these statistics, which is a relevant issue when parameters are transferred from a gauged site to an ungauged one.

Here we take advantage of a large dataset of high resolution precipitation data to explore the seasonal and spatial variability in parameters estimated from scaling and correlation analyses of high resolution precipitation data in the highly heterogeneous mountain environment of Switzerland where we expect variability due to local climatology and topography. The data are 10-min precipitation records at 62 stations of the SMA MeteoSwiss network with an average of 21 years of observations. For all stations coarse-graining of 10-min precipitation data up to a scale of approximately 1-day was conducted, the moment scaling relationships were estimated on annual and seasonal bases, and intermittency, breakdown and correlation functions were parameterised at all timescales. Relationships between the parameters that describe the precipitation scaling and correlation structure and measurement station characteristics such as location, altitude, mean annual precipitation, climatological region, etc., were investigated.

The results indicate that there is high seasonal and regional variability in the estimated parameters. Seasonal effects are generally stronger than regional ones. The summer season generally shows more structure in precipitation, shorter autocorrelation range

due to convective activity, high growth of intermittency and variability, and a resulting multiscaling behaviour in moments. Winter is at the opposite range, with spring and autumn in between. Although smaller than the seasonal effects, coherent and sometime strong regional differences are apparent. Most obvious and evident are the differences in the high Alpine region, where precipitation exhibits lower growth of intermittency, lower variability, and stronger autocorrelation, all of which lead to a simple scaling tendency in the moments.