Stochastic space-time precipitation inversion schemes

Boosik Kang\textsuperscript{1} and Jorge A. Ramírez\textsuperscript{2}
Civil Engineering Department, Colorado State University
Fort Collins, Colorado 80523

Abstract. A stochastic space-time inversion scheme is applied to downscale daily precipitation observed at a spatial scale corresponding to a pixel size of $256 \times 256 km$ into a spatial scale corresponding to a pixel size of $2 \times 2 km$. The inversion algorithm is a composite scheme consisting of 2 sub-models, 1) SSTDM (Stochastic Space-Time Disaggregation Model) which considers hierarchical structure of the spatial and temporal statistical dependencies of precipitation and, 2) IRCM (Intermittent Random Cascade Model) which is based on the scale-invariance feature and reproduces the self-similar structure and spatial intermittent cluster formation. For SSTDM, a general, linear disaggregation model (Valencia and Schaake, 1973), originally developed for multi-site, multi-season streamflow disaggregation, was modified in this work for use in the downscaling of grid precipitation. IRCM adopted the mass re-distribution concept of the multiplicative random cascade structure (Kang and Ramirez, 2001, Over and Gupta, 1996) The results of applying this inversion scheme on the precipitation field of July, 1997 are presented and briefly discussed. This model is expected to be suitable for downscaling of GCM model output to drive hydrologic models and carry out assessments of the impacts of climate variability on hydrology and water resources.

\textsuperscript{1} Boosik Kang, Ph.D. candidate, A312 Engineering Research Center, Civil Engineering Department, Colorado State University, 80523; e-mail: bskang@engr.colostate.edu
\textsuperscript{2} Jorge A. Ramirez, Associate professor, A222 Engineering building, Civil Engineering Department, Colorado State University, 80523; e-mail: ramirez@engr.colostate.edu