

The manuscript: **Stochastic spatial disaggregation of extreme precipitation to validate a Regional Climate Model and to evaluate climate change impacts over a small watershed** by P. Gagnon and A.N. Rousseau addresses the problem of evaluating whether a stochastic spatial disaggregation model enables the validation of the annual maximum daily precipitation (AMDP) simulated by a Regional Climate Model (RCM) over a small area when only a single observation point is available. They also quantify the difference in the evaluation of the Climate Change (CC) impact on AMDP between raw and downscaled RCM simulations. They use a statistical disaggregation model based on Gibbs sampling developed by the authors, which accounts for physical properties of the event (wind speed, wind direction, and convective available potential energy (CAPE)). The analysis is based on three simulations of the Canadian RCM (CRCM) covering the period 1961–2099 used over a small watershed (130km²) located in southern Québec, Canada. The topic is scientifically relevant and is within HESS' objectives. The paper is in general well written although some sentences should be rewritten in order to clarify the idea. Some misspelled words as well as some of the references that are wrongly cited must be corrected. I recommend this manuscript to be published after the following issues have been covered.

I would like to see in the final version of the manuscript:

- a) A justification of why they restrict the analysis to three simulations.
- b) A justification of why they restrict the analysis to only spatial disaggregation and do not consider time.
- c) A more thoroughly discussion of the possible advantages of the model used in this work compared with other disaggregation models reported in the literature.
- d) Page 8169, line 14, correct: Danemark.
- e) Page 8182, clarify the idea expressed in sentence from line 4 to 10.
- f) Page 8187, Lovejoy, S. and Schertzer, D.: On the simulation of continuous in scale universal multifractals,

part I: Spatially continuous processes, *Comput. Geosci.*, 36, 1393–1403, 2010. Is wrongly cited.