

## ***Interactive comment on “Spatial interpolation of daily rainfall at catchment scale: a case study of the Ourthe and Ambleve catchments, Belgium” by S. Ly et al.***

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Dear Reviewer,

We would like to thank you for your constructive comments.

The results in our paper are consistent with the result of many previous studies. Most of these were performed for some particular raingage density in some area. However, this study gathers the interpolation error for different raingage density used for the interpolation, which was not yet done in the literature. Previous findings reported that for sparse data, geostatistical interpolation outperforms techniques, such as the in-  
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verse distance weighting or Thiessen polygon (Goovaert, 2000). Moreover, the kriging with external drift is found to be the improved method. However, this work demonstrates that the inverse distance weighting and ordinary kriging are the best methods and found the limitations of the kriging with external drift when the fewest raingages are used. The kriging with external drift is not confirmed to be the improved method. Furthermore, being a first application of such methods at daily time step, we believed that this work contributes innovatively to the scientific research in the field of hydrometeorology. However, we will make discussion on more innovative result according to different points below.

From 30 years of daily rainfall, the variogram models change significantly from day to day. The utilisation frequency of the seven models will be reported in the revised paper. It can be concluded that among the seven models used, the Gaussian model is the most frequently used. More analyses and discussions will be done on the use of these seven models according to the seasons and rainfall patterns in the catchments.

The cross validation will be performed for some different type of rainfall, especially for the moment where there were serious inundations in the catchments. From these exercises, the error maps will be also generated in order to demonstrate the impact of the raingage position and the rainfall type on the interpolation error.

The idea of changing variogram model to avoid negative value is based on the literature (Deutsch, 1996). Negative weights in kriging occur depending on the variogram and may lead to negative and nonphysical estimates (Deutsch, 1996). Generally, there are two ways to avoid negative value: a posteriori correction by Deutsch (1996) or replace all negative interpolated values with a zero value. Both are pragmatic solution but not ideal. For some cases, the negative values are significant and it is hard to decide to be replaced by zero. In the revised paper, we will discuss more on the influence of the variogram models to the negative results by seasons.

The whole paper will be carefully revised and checked in order to highlight more clearly

the innovative result.

References:

Deutsch, C.V.: Correcting for negative weights in ordinary kriging. *Comput Geosci*, 22, 765-773, 1996. Goovaerts, P.: Geostatistical approaches for incorporating elevation into the spatial interpolation of rainfall. *J. Hydrol.* 228, 113–129, 2000.

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