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Hydrology and Earth System Sciences Discussions

Interactive comment on "On the benefit of high-resolution climate simulations in impact studies of hydrological extremes" *by* R. Dankers et al.

Anonymous Referee #2

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The purpose of this paper is to investigate whether high resolution climate simulations improve the representation of hydrograph statistics, with particular reference to flood simulations. The methodology involves the use of three experiments of the regional climate model HIRHAM, with different horizontal resolutions of 50, 25 and 12 km. These three different simulations are run through the model LISFLOOD, which uses a 5-km grid and has been calibrated against discharge records in 231 catchments in Europe. The HIRHAM output was regridded to the 5-km grid scale of LISFLOOD. Results do not demonstrate visible improvements in using higher resolution climate simulations.

In my opinion the outcomes of this paper had to be expected, since its purpose is a

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mission impossible. In addition, the methodology used is questionable. As a result, their conclusions are highly speculative. On the other hand, the paper is well written and clearly formulated.

I think that the authors, before trying to assess the impact of higher resolution climate scenarios on flood simulation, should perform a “feasibility” study of their work, given the large sources of uncertainty involved.

First of all, does the 12 km scenario of the RCM give a better representation of reality then the 25km, and of the 50km scenario? According to their work, this is only assumed (line 25 page 2585).

Second point. Is the LISFLOOD model sensitive to resolution of climatic input? For example, would model results chance when the 12km HIRHAM scenario is averaged at 25 and then 50 km? If not, the study is hopeless.

Third point. If the LISFLOOD model is run with higher resolution observed data, would it perform better? The authors should be aware that several studies in the field of hydrology have tried to prove the usefulness of higher spatial resolution of precipitation data, and only a few of them could prove their advantage. In most case, an opposite conclusion was drawn. In fact, the catchment acts as a low pass filter on the spatial heterogeneity of input data.

In paragraph 3.2 the outputs of the hydrological model are compared using a Nash and Sutcliffe coefficient. However, the differences shown in the hydrograph of Figure 3, most likely, reflect the differences in the dynamics of the three different input scenarios, rather than on their resolution. The same can be said for figure 6, which in my opinion shows that the input scenarios tend to become more similar when averaged on a larger area, but does not say much about the hydrology of smaller vs. larger basins.

As a result, all the conclusions drawn for what concerns the hydrology are in my opinion speculative, and of little interest to the hydrologic community.

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