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Interactive comment on "Downscaling GCM data for climate change impact assessments on rainfall: a practical application for the Brahmani-Baitarani river basin" *by* R. J. Dahm et al.

Anonymous Referee #2

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Downscaling GCM data for climate change impact assessments on rainfall: a practical application for the Brahmani-Baitarani river basin

By R. J. Dahm, U. K. Singh, M. Lal, M. Marchand, F. C. Sperna Weiland, S. K. Singh, and M. P. Singh

In this paper, the authors perform a climate change analysis for the Brahmani-Baitarani river basin in India. For this purpose, the authors use three GCMs. Further, because of absence of reliable long historic meteorological data in the study area, they use two easy to implement bias correction approaches. The authors conclude that in general

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Discussion paper

the south west monsoon rainfall, number of wet days and number of days with heavy rain are projected to increase over the study area. However, the authors also state that the APHRODITE dataset which is considered as the observed meteorological dataset underestimates the number of “heavy rain” events when compared to observed data of Central Water Commission (CWC) rain gauge stations and that this will affect the reliability of future climate change projections for precipitation. The topic is very relevant and such a study is especially useful for developing countries like India where data availability is always scarce. However, the current version of the manuscript neither makes any contribution in terms of the use of advanced state-of-art techniques nor does it provide any new insight for the study area. Therefore, in my opinion, the manuscript in its present state does not make a significant contribution to justify its publication. I therefore would suggest a couple of major revisions to improve the manuscript.

(i) The authors use APHRODITE data as the observed climatological rainfall dataset stating that it includes observations from over 2000 stations over India and captures the large scale features of monsoon rainfall over the Indian region well (Rajeevan and Bhate, 2008). In addition they also use observed rainfall dataset from three raingauge stations of CWC. However, for the study area, the authors could well have used a daily gridded rainfall dataset which is developed by the India Meteorological Department (IMD) (Pai et al., 2014). This is a high spatial resolution (0.25$\times$ 0.25 degree) dataset available for a long period (1901–2010) and has been developed using daily rainfall records from 6955 rain gauge stations all over India. Quite a few researchers have established that this IMD product is much more accurate than the APHRODITE dataset. In addition, station rainfall data for the study area is also available from IMD. There are quite a few raingauge stations in the study area (in addition to the three raingauge stations of CWC) for which daily rainfall data for 25 to 30 years are available from IMD. The authors may consider using these datasets. Thus, the study area is not as data scarce as has been made out to be by the authors.

However, given this situation, authors have a very good scope of improving their manuscript by considering different data availability scenarios. For example the authors may consider (i) availability of only IMD station raingauge dataset, (ii) only IMD gridded rainfall dataset (iii) only APHRODITE dataset (as they have done in the present manuscript) etc. This way the authors can test which advanced bias correction technique works best under different data availability scenarios. This would be a good contribution for data scarce developing countries.

Pai, D.S., Sridhar, L., Rajeevan, M., Sreejith, O.P., Satbhai, N.S., Mukhopadhyay, B., 2014. Development of a new high spatial resolution (0.25× 0.25) long period (1901–2010) daily gridded rainfall data set over India and its comparison with existing data sets over the region. Mausam 65, 1–18.

(ii) In general, the authors presented an increase/decrease or underestimation/overestimation in a given statistic. The authors should have also done checks on whether the increase/decrease or underestimation/overestimation is statistically significant. Also, the conclusions of the study (i.e. projected increase of SW monsoon rainfall, number of wet days and number of days with heavy rain over the study area) are more or less in line with what has been stated by previous researchers for the study area or the eastern region of India. So I do not see any new contribution here. But the reasons for such changes should be investigated and this could be a meaningful contribution.

Some of the important citations like Chaturvedi et al., 2012; Thrasher et al., 2012; Rana et al., 2014 are missing in the reference list.

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