Dear Reviewer 1.

Thank you for your time and the suggestions to improve our paper.

Please find below the reply for all of your comments.

1) The authors should discuss the quality of ERA-Interim analysis for the region especially in relation to the 4D structure of moisture, which is critical to the conclusions drawn in the paper.

R-1. Thank you. Please consider the paragraph bellow, which was added to the paper. It has been difficult to find a research concerning the ERA-Interim 4D improvements impacts in the atmospheric moisture field structure, specifically for the region under study.

The use in ERA-Interim of 4D-Var data assimilation contributed to better time consistency than the 3D-Var used in ERA-40. However, the agreement between the global tendencies of mass and total column water vapour (TCWV) and (E – P) is not very good in ERA-Interim, but it is still much better than for ERA-40 where (E – P) (Berrisford, 2011).

Sebastian et al. (2016) found a huge uncertainty in the estimates of (P–E) over South Asia, when computed from different reanalysis, but recommend to use atmospheric budget for computation of water availability in terms of (P–E) rather than based on individual values of P and E. We also consider that in the state of the art discussion of three reanalysis (ERA-I, MERRA and CFRS), Lorenz and Kunstmann (2012) obtained that the ERA-Interim shows both a comparatively reasonable closure of the terrestrial and atmospheric water balance and a reasonable agreement with the observation datasets. This findings support the use of ERA-Interim reanalysis for running FLEXPART in order to reduce the uncertainty in this study. In the same way, the Vertical Integrated northward and eastward Moisture Flux data to calculate the Vertical Integrated Moisture Flux (VIMF) and it´s Divergence belong to the ERA-Interim Reanalysis with a resolution of 1°×1°. Computing the (P–E) directly from atmospheric budget with divergence of moisture flux for different reanalyses improved correlation with observed values of (P–E) according to Sebastian et al. (2016) results; what we consider to do in future studies to evaluate the ability of different reanalysis in the representation of the moisture budget for the target region.

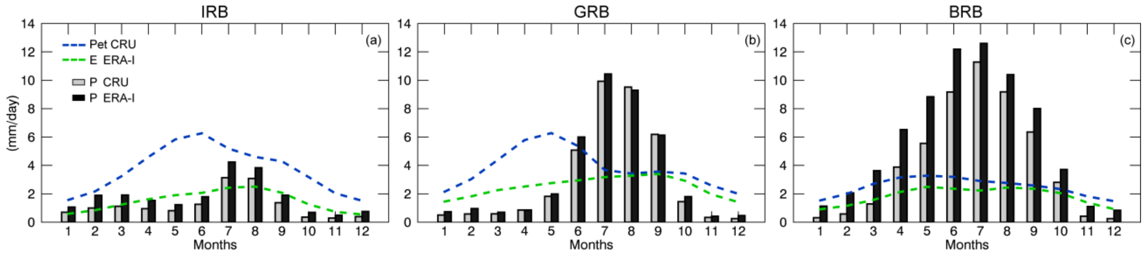
2) Will the inconsistency of using E and P and the other meteorological variables from independently different sources have some bearing on the result? Does E-P from ERA-Interim look like Fig. 2? If not then how much of that is affecting the results of the paper?

R-2. Thank you for your questions. The idea of using datasets from different sources was first because certain datasets like from CRU permitted to calculate easily the SPEI. Daily data from CHIRPS also made possible to utilize a combination of rain gauge data and satellite to stablish onset and demise dates for the monsoon in the basins. An advantage of CHIPRS is that the data cover all the period under study while from Aphrodite are only available until 2007. We made a new Figure 2, described the results, and compared them with previous findings (Please read the section 3.1). The next sentences have been also added to the paper.

3.1 The precipitation and evaporation over the basins

The mean annual cycle of the Precipitation (P), Evaporation (E) and Potential evapotranspiration (Pet) over the Indus, Ganges and Brahmaputra basins appears in Figure 2. For the three basins, the maximum P occurs during the summer months. It can be observed that monthly P values from ERA-I tend to be slightly greater than those computed from CRU, but the annual cycle is the same. These differences are best appreciated in the annual cycle of P over the BRB. In the IRB, the P annual cycle is characterized by two maximum peaks in February-March and July-August (Fig. 2a). The E follows approximately this cycle but with lower values. In this basin, the Pet remains higher than the P and E across the year; in fact, Cheema (2012) argue that the major part of this basin is dry and located in arid to semiarid climatic zones. Laghari et al. (2012) also found for the climatology from 1950–2000, that Pet exceeds P at the IRB across the year. Pet is enhanced after maximum precipitation; maximum values occur in May-June. Over the GRB maximum P occurs between May and October and is greater than over the IRB. The Pet and E annual cycles over this basin differ, and as expected, Pet > E. The Pet annual cycle is mainly like for the IRB. Indeed, both variables reflect close but different information. The E annual cycle agrees to that obtained by Hasson et al. (2014) for the three river basins. Over the BRB, the monthly average precipitation both from CRU and ERA-I increases abruptly from March until a maximum (>11.0 mm/day) in July and later falls until a minimum is reached in December (Fig. 2c). The Pet and E are very close and does not surpass 4 mm/day in the annual climatology. Particularly the Pet annual cycle highlights for being lower than what was obtained for the IRB and GRB. The annual cycle of P (from CRU and ERA-I) and E for the IRB, GRB and BRB follow the same annual cycle than those obtained by Hasson et al., (2014). These authors analysed the seasonality of the hydrological cycle over the same basins for the 20th century climate (1961–2000 period) utilizing PCMDI/CMIP3 general circulation models (GCMs) and observed precipitation data.

Tropical cyclones and weak disturbances contribute to monsoon rainfall. Among these systems, the most efficient rain-producing system (responsible of about half of the Indian summer monsoon rainfall) is known as the Indian monsoon depression (MD) which generally forms around Bay of Bengal and propagates westward or northwestward with the typical life span of three to six days (Ramage 1971; Yoon and Huang, 2012). The change in the large-scale circulation, especially the converging atmospheric water vapour flux is responsible for the MD modulation by the 30-60 day monsoon mode (Yoon and Huang, 2012). Over the Brahmaputra basin, the rainiest, heavy rainstorms are due to the shifting of the eastern end of the seasonal monsoon trough to the foothills of Himalayas in the north and the 'Break' monsoon situations during the monsoon season (Dhar and Nandargi, 2000). Summarizing, the BRB is wetter than the western GRB and IRB; this is because the monsoon rainfall dominates in the summer months in the eastern region and gets weaker on the western side with a time delay of a period of weeks (Hasson et al., 2014).



3) Is there any merit in using E-P from ERA -Interim even if it does validate with other independent observations because of balancing the water budget?

R-3. Please consider this sentences we already included in the paper.

Sebastian et al. (2016) found a huge uncertainty in the estimates of (P–E) over South Asia, when computed from different reanalysis, but recommend to use atmospheric budget for computation of water availability in terms of P–E rather than based on individual values of P and E. We also consider that in the state of the art discussion of three reanalysis (ERA-I, MERRA and CFRS), Lorenz and Kunstmann (2012) obtained that the ERA-Interim shows both a comparatively reasonable closure of the terrestrial and atmospheric water balance and a reasonable agreement with the observation datasets. This findings support the use of ERA-Interim reanalysis for running FLEXPART in order to reduce the uncertainty in this study. In the same way, the Vertical Integrated northward and eastward Moisture Flux data to calculate the Vertical Integrated Moisture Flux (VIMF) and it´s Divergence belong to the ERA-Interim Reanalysis with a resolution of 1° × 1°. Computing the P–E directly from atmospheric budget with divergence of moisture flux for different reanalyses improved correlation with observed values of P–E according to Sebastian et al. (2016) results; What we consider to do in future studies to evaluate the ability of different reanalysis in the representation of the moisture budget for the target region.