

Interactive comment on “Seasonality of the hydrological cycle in major South and Southeast Asian River Basins as simulated by PCMDI/CMIP3 experiments” by S. Hasson et al.

Anonymous Referee #2

Received and published: 7 October 2013

Review of "Seasonality of the hydrological cycle in major South and Southeast Asian River Basins as simulated by PCMDI/CMIP3 experiments" by Hasson et al., 2013, submitted to ESDD

Dear Editor and authors,

The submitted manuscript will make a useful addition to the literature on the subject of the hydrological cycle in major monsoon-affected river basins of South and Southeast Asia. From this climate scientist's perspective, the focus on the basin scale is interesting and a useful alternative to the more traditional approach of model assessment, based on grid points or country-averaging depending on the metric chosen. The impor-

C482

tance of these basins is not in doubt, given their need for agriculture and water supply. It was also nice to see mention of western disturbances in the manuscript, to paint a full picture of the seasonal cycle performance in these models.

I recommend acceptance following satisfaction of a few minor points noted below, as well as numerous spelling or grammatical errors, not all of which I have listed. In addition, I suggest that attention is paid to making sure that the statistical significance of any differences stated is taken into account. Further, the manuscript does feel rather long to read, and it would be worth taking the time to ensure that it is written succinctly. Finally, given the aforementioned difference in methodology with normal model assessment or climate change studies for this region, it would be worth taking more care to put the river-basin measured changes and errors in the context of those noted in other studies for the Asian monsoon sub-regions as a whole.

Minor comments: P628, line 6: perhaps "present-day" should be elaborated on, to mention the 20c3m experiment. P628, line 7 and throughout: I think the more common classification for centuries should be used (20th, 21st etc). P628, lines 16-19: the use of either/or brackets here is very confusing and I suggest this sentence is rephrased. P628, line 11: A major omission here is the work of Sperber et al. (2012, Climate Dynamics, "The Asian Summer Monsoon: An Intercomparison of CMIP5 vs. CMIP3 Simulations of the Late 20th Century" published online <http://dx.doi.org/doi:10.1007/s00382-012-1607-6>), which examines Asian monsoon biases across the mean, seasonal cycle, variability on a variety of scales in the CMIP3 and CMIP5 models. This could be referred to at several points in the manuscript. P631, lines 2-5: It may be true that MME estimates do not necessarily outperform a given model, but in Sperber et al. (2012, see above) this is the case for all chosen metrics for the Asian monsoon. This should be commented on. P634, lines 14-22: A useful reference here would be Immerzeel et al. (2010, already cited), which shows little contribution of snow/glacier melt to Ganges flow. P636, line 20: is this calculated on the basin mean or at each gridpoint first? P637, lines 1-6: I found the logical

C483

statements here quite confusing and I suspect other readers would too. I suggest an alternative is found. P638, line 25 onwards: Sperber et al. (2012, listed above) and Annamalai et al. (2007, already cited) should be mentioned here in the context of their findings of onset timing for the CMIP3 models. Later in the paragraph, commonalities may be found with the Sperber et al. (2012) study and their comparison of onset timings and duration. P640, Evaporation: please remind the reader that no observations are used. P642, lines 3-7: where do the assumptions for discharge time of the river basins originate? P643, lines 14 & 18: how can HadGEM1 have good qualitative agreement yet an onset delayed by one month? P643, line 15 onwards: how do the good models chosen here compare with the whole monsoon in Annamalai et al. (2007) or Sperber et al. (2012)? P644, lines 1-2: wind speed, having a twin-peaked annual cycle for monsoon areas, is also important for evaporation. P645, lines 3-4: where is the evidence for models' negligible spring snowmelt? P646, Lines 1-3: as earlier, it would be useful to compare with the onset metrics used in Sperber et al. (2012). P649, lines 1-3: why does one expect a shorter delay (I'm guessing due to the length of the river/size of the basin: it would be useful to include this information for the non-hydrologist)? Can the difference be quantified? P649: it might be worth splitting sections 4.1 and 4.2 into new sections 4 and 5 respectively. In addition, it would be worth referring to more of the published literature on climate change/monsoon throughout section 4.2. This will help relate this manuscript, and its river basin/hydrological focus, with existing work that often approaches the topic from a country-wide or grid point scale. P654, line 8: can the suggested increase in snowmelt not be measured from the model outputs? P654, lines 13-18 and throughout: no mention is made of how the statistical significance of the results (or lack thereof) is assessed. Some attempt should be made to understand the significance of the differences found (e.g., from present-day to sres climate), perhaps using Student's t-test or otherwise. P655, conclusions: it would be sensible to reference other works looking at Asian monsoon/climate change here, as well as those which examined model fidelity, in order to draw comparisons with the results here. P656, line 26 onwards: It is certainly a useful goal to be assessing the

C484

runoff generated from the various land-surface component models, but to do this accurately the observed discharge at various points in the river basin would be required. Can the authors comment on the need for these data to be made more easily available to the (hydro)climate community? P659: Most of the discussion here focuses on the additional information that could be provided by dynamical downscaling. However I feel this misses the point somewhat. Without improving the models, these are only going to give more detail on the nature of the error (useful in itself). But what is really needed is more reliable and available discharge observations from various points in each of the river basins. P659, final paragraph: it may be useful to refer to specific examples, such as the Pakistan floods of 2010, where human/land use factors have undoubtedly played a role in the severity of the damage. Figures 3-5: perhaps a narrower range could be used for the evaporation scale. Figure 6-7: sub-titles on each panel would help these figures.

Spelling/grammar: P628, line 21 and throughout: replace "precipitations" with "precipitation". P629, line 14: replace " GCMs " with "GCM". P630, line 11: the phrase "have been performed in this regard" does not fit well in this sentence. I suggest replacing with "have all demonstrated model biases". P635, line 22: change "high" to "higher"; lines 26-27: I suggest putting "more likely" in brackets "()". P637, line 18: replace "during" with "from". P639, line 1 and throughout: it seems more common to give the CMIP3 models lower-case names. This is unimportant however. P642, line 13 and throughout: "the" is missing before monsoon; line 21: replace "such model" with "PCM" for clarity. P644, line 23: replace "what" with "that". P645, line 14: replace opening of sentence with, "The Brahmaputra basin's precipitation is"; line 18: replace "at qualitative level" with "at a qualitative level". Again on line 20; line 24: replace "CIMP3" with "CMIP3". P646, line 9: replace " models' " with "model". Again on p648 line 11, and throughout. What you have written is not incorrect, but the alternative is less clumsy. P649, lines 16-18: the first sentence here does not make much sense and it would be useful to rephrase; line 19: perhaps "seasonal cycle" would be more suitable than "intra-annual". P651, line 1: please define "HKH"; line 28: Insert "The" before "only".

C485

P652, line 1: remove "a"; line 3: insert "the" before "same"; line 5: replace "here" with "the reader"; line 27: insert "a" before "scenario". P653, line 12: change "suggest" to "suggests". P656, lines 3-11: this whole sentence is far too long and convoluted. I suggest it is re-written; line 28 onwards: this sentence is too long and should be re-written. P659, line 18: correct "proceduers". P661, line 17: correct "Wesbster".

Interactive comment on Earth Syst. Dynam. Discuss., 4, 627, 2013.