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Earth System Dynamics Discussions

Interactive comment on "Seasonality and spatial variability of dynamic precipitation controls on the Tibetan Plateau" *by* Julia Curio and Dieter Scherer

Anonymous Referee #3

Received and published: 21 March 2016

Summary:

The study described in this manuscript investigates the impact of five selected dynamic controls (horizontal wind speeds at different levels, vertical wind speed, atmospheric water transport and planetary boundary layer height) for precipitation in High Asia. The study's novelty lies in the use of a relatively new high resolution dataset to answer questions that have previously not been addressed. The conclusions reached are supported by the findings. They are scientifically valuable and presented in a logical and intuitive way. The title and abstract are concise. However, I do have a few questions, concerns and suggestions regarding the methods applied and language used in the manuscript. After consideration of those and moderate revisions I recommend publication of this manuscript.

General Comments:

The statistical methods used in this study are suitable for addressing the questions. However, since the findings and conclusions rely heavily on purely statistical methods (mostly Spearman's rank correlation), I would like to see them discussed in more detail (see specific comments). The authors should also describe how the significance of rho was calculated. (I believe this is missing entirely from the manuscript). The PCA is suitable for describing the spatio-temporal variability of correlation of controlling factors and precipitation.

I am not sufficiently familiar with specific shortcomings of the HAR dataset to comment on whether or not the authors adequately addressed these in the manuscript and took them into consideration when drawing conclusions. However, since this study is entirely based on HAR, I would appreciate some comments on existing uncertainties of the dataset and how/whether or not this limits the interpretation of the results of this study.

There are numerous grammatical errors throughout the manuscript and sentence structure is often confusing. This makes it very difficult to read and understand in certain sections. I highlighted some of these in the "technical comments" below. I strongly recommend the authors edit the language of the manuscript and let a native speaker (or someone with a similar level of written English) review it before resubmission.

Specific Comments:

Page 2, line 8: You write here and later on that you select six factors. However, you only list five here (and in the results). Maybe I am missing something?

Page 2, line 15: What is this assumption based on? I expected a little more explanation for the selection of controlling factors – scientific or purely technical. Also, what factors were excluded and why?

Page 4, line 33: How was the 0.1mm threshold chosen? In context of the study's aims, what are the advantages of choosing an absolute value instead of a grid-box specific

percentile for example?

Page 4, line 37: It may be more insightful to highlight the advantages of the Spearman rank correlation over other measures of statistical dependence for this particular question involving precipitation and its controlling factors.

Page 4, line 39: There are multiple ways in which the statistical significance of such a correlation can be determined. I recommend that you at least mention in one or two concise sentences how it was determined in this study. Also, how sensitive are your results to different, commonly used significance levels, e.g. 0.01? Since the correlation analyses form the centre piece of your study (and the PCA's are also based on correlation coefficients), I think it is necessary to provide a little more insight.

Page 5, line 1-3: Maussion et al. use this clustering approach to classify glacier accumulation regimes. While the analysis itself is a universal tool of of descriptive statistics fitting for the aims of the study, I recommend the addition of justification for deviation from the Maussion et al. clustering since you present this as something that builds on that study. For example, why choose seven instead of five clusters as Maussion et al. do? (see comment below)

Page 5, line 5-8: As I understand, you varied k for the clustering to determined the optimal number, i.e. the number giving you good coherence within the classes and sufficient distinctions between them. What was the k range you used and how did you determine optimal k? Was this apparent from a qualitative assessment of plotted results or was it determined by something like a discriminant analysis? Furthermore, for similar clusters such as purple/red and yellow/green, I recommend adding comments on the sensitivity of the clustering to physical conditions versus HAR/WRF limitations. In other words: is the separation of yellow and green physically meaningful?

Page 7, line 32: Could this pattern be the result of a gravity wave?

Page 12, line 1-2: This is a very general comment and does not go into the type of

correlation you are dealing with in this study. I believe Spearman's R to be adequate here, but I recommend adding a word of caution, since a nonparametric measure for correlation limits the interpretation of R values. It is not a source of uncertainty as such, but should be mentioned somewhere in the manuscript (along with more details on the significance tests and the sensitivity of results to significance levels)

Technical Comments:

There are too many grammatical errors to highlight all in this section. Furthermore, the phrasing of many sentences is confusing. I strongly suggest to let a native speaker to review the language of this manuscript.

Page 1, line 33: "strenghtening" instead of "strengthen"

Page 1, line 31-33: This sentence is confusing. Think about rephrasing it or breaking it up into two sentences.

Page 2, line 3: Do you mean "gives us the opportunity for a process based analysis of the data"?

Page 2, line 5-7: Change to something like "Therefore, we want to examine the timing, location and strength of the influence of precipitation controls on precipitation development."

Page 2, line 7-8: Rephrase to something like "The aim of this study is to describe the spatial and temporal correlation of [...]"

Page 2, line 12: I suggest citations at this point when making statements about the influence of the factors being known.

Page 2, line 25: Abbreviations should be introduced earlier in the text when their full names are first mentioned.

Page 2, line 33: Change to "correspond to"

Page 2, line 35: Change to “at a height”

Page 2, line 36: “[. . .] which strength and location [. . .]” - review the grammar here/rephrase.

Page 3, line 7: “windward side” is more commonly used in English than “luv side” (which is still common in German literature). I recommend changing it throughout the manuscript.

Page 3, line 45-47: This is not gramatically sound (see comment Page 2, line 12)

Page 4, line 1-2: This is not gramatically correct.

Page 5, line 19: Correct to “[. . .] precipitation is falling in this region, [...]”

Page 5, line 25: “There” should be the start of a new sentence for this to be grammatically sound.

Page 5, line 30-33: This sentence is confusing and not grammatically correct. Please rephrase.

Page 5, line 35: Correct to “its”

Page 5, line 44: Correct to “evenly” (adverb)

Page 7, line 30: Do you mean “This supports the interpretation [...]”?

Page 8, line 4: Correct to “Therefore”

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