Hydrology and
Earth System
Sciences
Discussions

Interactive comment on "Spatial distribution and trends of different precipitation variability indices based on daily data in Northern Chile between 1966 and 2015" *by* Oliver Meseguer-Ruiz et al.

Anonymous Referee #2

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This paper calculates a series of precipitation indices in Northern Chile and analyse their spatial distribution and trends over 1996-2015 period. There is some nice discussion on the different precipitation indices and their relationship with topography and climatic characteristics of the study region, which they relate with previous findings. However, the authors have not clearly elaborated how these analyses contribute to the objectives of the study (stated in the introduction). The manuscript cannot be read fluidly, and there are some logic sequences in the argument that are hard to follow. I think the topic can be of interest for HESS audience, however, the manuscript would require some major improvements. Below I provide some general comments, followed by a series of specific questions and recommendations.

General comments:

The authors generate a series of indices for each meteorological station, and then spatially distribute these indices based on interpolations techniques. Have the authors considered to use a gridded precipitation product instead, and then calculate the indices for each cell? I think is more physically robust since we have more information about the spatial distribution of precipitation phenomena (e.g., regional models, geo-statistical interpolation). Can the authors elaborate on this?

There is a new platform with climate projections for the region that I think should be explored as part of the literature review of this work (http://simulaciones.cr2.cl).

Tables are placed at the end of the manuscript, while Figures are placed within the text. Please maintain consistency.

Tables: commas should not be used for decimals.

The complete manuscript should be revised since there are plenty of grammatical errors that do not permit a fluid reading.

Specific comments:

Abstract: "precipitation is recorded in a very constricted season every year". Is it that the recording is constricted or that the events are very rare? please clarify.

"Accumulated rainfall presents very high differences from one year to another, and this makes that climate projections have a very low degree of confidence in this area. So to this region it is more interesting to study the irregularity of precipitation itself instead of the accumulated rainfall values." The logic sequence of these sentences is not clear, please elaborate the point.

"These results will help to improve climate projections for these region and to inform the development of water management policies." It is not clear how climate projections and water management policies can use such results. Can the authors clarify? Also,

there is a typo in 'these region'.

P2L5-8: can the authors elaborate on the logic of these sentences?

P2L20: This sentence requires further discussion. There are studies aiming at differentiating these two effects (e.g., Boisier et al., 2016).

P2L21: there is literature available analysing projected changes in the region, which I think is more suitable than the cited work.

P2L21: should say 'even though'

P4L2-3: is not clear how the confidence of future projections may be more accurate by a better understanding on the temporal behaviour of precipitation. Can the author elaborate this point?

P4L3-5: the last sentence is not clear. Please re-phrase.

P5L2: "..." should not be used in scientific writing. Please re-phrase and correct typo ("do not varies")

P5L9: please provide references to support the statement: "an area where climate projections are not able to determine a clear trend for precipitation".

P5L11: is not clear how the determination of indices trends can be used to discriminate natural variability from anthropic forcing. Please elaborate and provide references.

P5L14-15: please correct grammatical errors.

Sect. 2.1: There is a missing citation for the meteorological stations (institution, where were the records obtained from, etc.). Also, general statistics on the record lengths (mean, min, max) could be provided, as well as the percentage of missing records. In addition, the elevation of meteorological stations should be provided (to have an idea of the representation of altiplanic zone).

Given the convective nature of precipitation events in this area, we expect to see many

"outliers", so I wonder if the quality control applied here is correct.

Can the authors explain how they fill missing data? they mention "undoing the normalisation of the reference series", but is not clear how the procedure is done, and under what assumptions. How much missing data is allowed?

The rest of sect. 2.1 is hard to understand, please improve the methodological description. Probably providing equations may be useful.

Sect. 2.3: There is a finer topographical resolution available (e.g., SRTM at 30-m), which I think is more suitable for this region (characterised by high elevation, but also low slopes in some sub-areas). Especially if this is the data used to calculate the gauge elevation.

Please correct the last sentence of the section.

Sect. 3.1: It is not clear how the regression coefficients are obtained. Please clarify.

Please correct the number of the equations.

Conclusions: Please correct grammatical errors.

P15L26: please elaborate the statement "the high degree of irregularity shown between years make climate projections have a very high degree of uncertainty:

P16L8: can the authors provide examples on how the generated information can be used to water management policies?

References: Boisier, J. P., R. Rondanelli, R. D. Garreaud, and F. Muñoz (2016), Anthropogenic and natural con- tributions to the Southeast Pacific precipitation decline and recent megadrought in central Chile, Geophys. Res. Lett., 43, 413–421, doi:10.1002/2015GL067265.

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