Nat. Hazards Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/nhess-2018-403-RC2, 2019
© Author(s) 2019. This work is distributed under
the Creative Commons Attribution 4.0 License.

Natural Hazards and Earth System Sciences
Open Access
Discussions

Interactive comment on "Drought risk in the Bolivian Altiplano associated with El Niño Southern Oscillation using satellite imagery data" *by* Claudia Canedo-Rosso et al.

Anonymous Referee #2

Received and published: 12 October 2019

GENERAL COMMENT

The paper is focused in the study of drought risk generated by climatic variables during ENSO occurrences and it is oriented to agricultural issues and related impacts on Bolivian Andes. For the last, the authors used potato and quinoa crop measurement data, to be related with temperature and precipitation information on ENSO composite periods. Additionally, the document assessed the detection of specific drought hotspot areas in base the NDVI vegetation index. Crops were related with NDVI variability, and the last was linked with climate variables as precipitation and accumulated degree day data. In general, the document is oriented to impacts on agriculture generate by

droughts during strong El Niño events.

MAIN COMMENTS

The authors didn′t clarify their risk definition, for example, in front to an extreme drought even during any kind of warm ENSO phase, the risk can be very low or cero if the direct affected population has very low vulnerability. Then, the mention of risk implies knowledge about the conception of risk, vulnerability and hazardous events (i.e., the danger amount), which are not well described in the current document.

lack of good bibliography review.

P1 section 1. The general idea is the impacts of ENSO in agriculture and food security, but there is not so much to risk.

P3 L4. The title is covering a lot of issues. Risk is not only studied on agricultural context. My suggestion is to change the title to something like "Agricultural drought impacts during the ENSO over the Bolivian Altiplano".

P3 L23. CHIRPS is a good dataset for precipitation information, since it is a mixed observation product (satellite products, station data, etc.), but here is necessary to indicate the problems using it over Andes or over South America. Several papers are pointing out that the CHIRPS across the Andes overestimate/underestimate in lower/higher values, respectively.

Paredes-Trejo et al. 2016. Intercomparison of improved satellite rainfall estimation with CHIRPS gridded product and rain gauge data over Venezuela. https://doi.org/10.20937/ATM.2016.29.04.04

Paredes-Trejo et al. 2017. Validating CHIRPS-based satellite precipitation estimates in Northeast Brazil. https://doi.org/10.1016/j.jaridenv.2016.12.009

Rivera et al. 2018. Validation of CHIRPS precipitation dataset along the Central Andes of Argentina. https://doi.org/10.1016/j.atmosres.2018.06.023

P4 L3. The LST-NDVI association is usually used for drought monitoring, then why didn′t the authors explain nothing about it in the introduction and/or in the section 2.1?.

Karnieli et al., 2010. Use of NDVI and Land Surface Temperature for Drought Assessment: Merits and Limitations. https://doi.org/10.1175/2009JCLI2900.1

P5 L5. Since the raw data have cyclicity/periodicity parts, then the 0.7 Spearman correlation should represent a very low association or linearity. Before to start the comparison, it is necessary that the authors remove the cyclicity/periodicity parts from the assessed information.

P6 L10. The LST definition is different that the gauged air temperature from weather stations. LST is defined by Stephan-Boltzmann law, and on the other hand, the air temperature is defined by climate patterns and process. Moreover, as before indicated, the LST-NDVI relationship is a good method for monitoring drought, more than air temperature – NDVI. The authors should work with the LST but need to improve the correction procedure with some in ground LST measurements or other alternative way.

P7 L8. The crop yield vs NDVI is given values on 0.6 Spearman correlation, and it is yielding a little ambiguous result, the authors should bring information like, for example, how much is the explained variance of this relationship? i.e., How much does the NDVI explain the yield?

P7 section 2.4. Was only a set of 2 predictors that were assessed in the regression analysis? if not, which are the other discarded predictors in the regression analysis? more than see the statistical results, the Authors should explain the physical reasons why the others preselected predictors were considered as potential predictors and why they were discarded.

P9 section 3. The data analysis should be done after to remove the cyclicity/periodicity of the data, to be comparable between them.

P10 L7. This could be moved to conclusion section.

P10 L8. “all dataset had acceptable bias” this affirmation is something subjective since the bias can be between 15% to 35%, then it is far to be considered as an acceptable bias. More than the references indicated for the authors (those can show values acceptable in other context), Can the authors show any way or calculation to corroborate that that range of bias is “acceptable”? Another option, in my point of view, is removed this assumption.

P11 L27. Again, the LST temperature has a different physical definition than air temperature. Moreover, the LST- ENSO relationship is given as the ENSO alters the air temperature patterns globally, and that air temperature influences vegetation and agricultural productivity (Glennie and Anyamba, 2018), then on ground level, additionally that air temperature, the vegetation cover, albedo, and soil properties (and others) are affecting the ground temperature generated by emitted radiation on the ground. This means that the ENSO-LST and ENSO- air temperature teleconnections have different mechanisms, then the correction of LST with air temperature has not sense since we expect to assess the crop yields. Hence, the suggestion that the LST underestimation could be due to elevation and/or cloud cover is not correct too.

Glennie and Anyamba, 2018. Midwest agriculture and ENSO: A comparison of AVHRR NDVI3g data and crop yields in the United States Corn Belt from 1982 to 2014. https://doi.org/10.1016/j.jag.2017.12.011

P12 L25-L26. This phrase is ambiguous. Something that the authors can do is to calculate the explained variance per each predictor, and it associates with location coordinates.

P13 L5-L6. Although the lag values are expected to be between 3 or 4 months, the lag differences between precipitation and vegetation per location can be explained on base to local landscape elements (e.g., Yarleque et al. 2016).

Yarleque, C., M. Vuille, D. R. Hardy, A. Posadas, and R. Quiroz (2016), Multiscale assessment of spatial precipitation variability over complex mountain terrain using a

high-resolution spatiotemporal wavelet reconstruction method, J. Geophys. Res. Atmos., 121, 12,198–12,216, doi:10.1002/2016JD025647.

P13 L11-L12. “The hours of sun required for crop development could be the explanation for these results” It is true in part, see me previous comment. On this Andes region is necessary consider aquifer or ground water level changes (i.e., moisture on ground level) from Mountainous regions to flatter/lower elevation areas.

P14 L4. Here was linked a generated index with sea surface temperature anomalies against the crop yield signal with anomalies+ periodicity/cyclicity?. If this is the case, then I expect that the results bring a kind of non-physical statistical information.

Figure 5. In this figure is given boxplots with only the 1982-1983 strong El Niño case as outlier, the rest of cases for quinoa and potato are given a non-statistical difference with other years, since the rest of cases are intercepting the range of the boxplots, i.e., between the maximum and minimum possible values, contradicting the conclusions of the authors.

P16 L1. How is the “magnitude of assistance” calculated/estimated?.

DETAILED COMMENTS

P6 L7. Four or three?

P6 L7. “but not the satellite not and” changes to “but not the satellite and”.

P8 L5. “potato was 4°C and 3°C for quinoa” changes to “potato and quinoa were 4°C and 3°C, respectively”

P8 L10. What’s “5 percent level” exactly mean?

P9 L7. “with” changes to “during”.

P9 L11. Add “strong” before that “El Niño”

P9 L12. Add “strong” before that “El Niño”

P12 L7. Remove “is”.

P12 L11. “. And” Changes to “, and”.

P14 L7. “warm” changes to “strong”.

P15 L2. Add “strong” before that “El Niño”.

P15 L9. Add “strong” before that “El Niño”.

P15 L20. Remove “is”.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2018-403, 2019.