Nat. Hazards Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/nhess-2018-133-RC1, 2018

Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Early warning and drought risk assessment for the Bolivian Altiplano agriculture using high resolution satellite imagery data" *by* Claudia Canedo Rosso et al.

Anonymous Referee #1

Received and published: 14 June 2018

In this article, in-situ observed temperature and precipitation data are compared against satellite data for Bolivia. By distinguishing between El Nino and La Nina years, the impact of this phenomenon on agricultural yield is quantified. In addition, satellite-observed NDVI values are compared against agricutural production data. The authors argue that this analysis contributes to an early warning system for crop deficits.

While the general idea of the study is interesting and the societal importance of an early warning system for crop failure is of obvious importance, the current work leaves much to be desired. The promise of an early warning system in the title is not met, satellite data is used sparingly and the attempt to provide a true risk assessment is

Printer-friendly version

Discussion paper

poorly executed. Some of the analyses are interesting, but interpretation of some of these results lacks. Below, these points are explained in more detail.

I am afraid that the current ms. needs considerable work to grow to an acceptable level. My advise to the editor is to reject the ms. in its current form.

Main concerns

1) regarding promisses made in the title: Risk is commonly seen as a combination of 'hazard', 'vulnerability' and 'exposure'. There is a considerable body of literature on this view. The authors have focused on 'hazard' - which is the meteorological aspect of drought (i.e. lack of rain in this case). It is no problem to focus on 'hazard' only - but be clear on this. Also, the 'early warning' aspect of this work is actually nothing more than the statistical relation between ENSO and crop yield, suggesting that when a particular phase of ENSO is forecasted the predictions, then a increase/decrease in precipitation and a response in crop yield is to be expected. Putting forward a statistical relation as 'early warning system' is a bit overdoing it.

2) Satellite-sourced NDVI data are used to compare against crop yield (table 2 and fig. A6). This is an interesting aspect - but it is really something new or unexpected? The other source of satellite data (precipitation from CHIRPS), where do you actually use these data? I see a rather extensive comparison between satellite-based estimates of precipitation and rain gauge data, but where does the satellite data actually enter the analysis? There are no maps of precipitation - which would the minimum to expect when using satellite data.

3) Some results, like those in fig. A6, are interesting. But the question which pops-up immediately when seeing this figure is: why does Oruro behave so much different than the others? This is not discussed and not even observed actually. Similarly, fig. A4 could be interesting as well, but no attempt is made to determine the length and start of the period over which precipitation is accumulated to understand this relation. No motivation is given why the accumulation period is chosen at it is. Also, equation 1 is

introduced, but we see the influence of precipitation only (and not temperature as well).

Other aspects the authors could look into

*) the article is a bit wordy, it could be shortened and made more concise.

*) page 2, line 32. A simple correlation analysis between November-March precipitation and a ENSO index would be great in explaining the relevance of your study. This can be done by using the Climate Explorer (climexp.knmi.nl) using standard available data (or you upload your own data).

*) page 4, line 17. Quantify the amount and length of data gaps you treated by infilling with mean monthly values.

*) I am not very familiar with the CHIRPS data. You write that it is based on the TRMM satellite and the 3B42 product is available since 2000. However, on line 32 of page 4, you claim that the data goes back to 1981. Can you provide a little more explanation?

*) page 5, line 20. Bimonthly means "every 2 months". I guess you mean something like "semimonthly" (at least that is what the Merriam-Webster online dictionary suggests).

*) page 5, lines 27-30. Here you should give a some more detail on the validation of processed NDVI values. Simple questions like: does it reproduce the seasonal cycle? are worth looking into and they give the reader the confidence that this might actually work! For example, a scatter plot of 15-day NDVI values against yearday for a few selected pixels.

*) page 6, line 18. When a correlation exceeding 0.7 is found, I take you label the satellite data as reliable, right? What if this threshold is not reached, what part of the analysis is then not possible?

*) page 6, line 31. Accumulated precipitation and accumulated temperature. Accumulated over what periods? In section 4.2 I read that precipitation is accumulated for 12 months, starting in July. Why is that? Also the start of the accumulation period is

relevant, especially for the degree day metric.

*) page 9, line 4-5. The relative error in the wet season is small because the amount of precipitation is so large - not becuase of small errors in the estimate. Please use a different metric to quantify the accuracy of the satellite-based precipitation.

*) section 4.1 ends with the conclusions that CHIRPS is doing quite well, but the spatial aspect is lacking in this analysis. Are there stations/regions that are over or under estimated? A map with average RMSE valus for January and July would be great here. Note that the distribution of rain gauges is not too homogeneous - so a little caution is in place here.

*) page 10, line 3. Here we see 'mean of maximum annual NDVI' - which is new to me (at least, I did not see it discussed earlier in the article).

*) page 11, line 23-25. Here the text seems to suggest that the 'ENSO warm phase' and 'extreme drought' are two separate things. Obviously, the effects of ENSO is the drought. Please rephrase.

*) fig. A3. Strange that winter values of relative ME and relative RMSE have wide distributions, while the individual months have very narrow distributions. Also: simply leaving-out values (like the monthly June and July values) when they do not fit in the plot, is not done. Include these in the plot and adjust the axis (put in a break - meaning skip some values in the axis - or use a non-linear axis).

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2018-133, 2018.

Printer-friendly version

Discussion paper