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Geoscientific Model Development Discussions

Interactive comment on "TAMSAT-ALERT v1: A new framework for agricultural decision support" *by* Dagmawi Asfaw et al.

Anonymous Referee #1

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General comments:

This is a highly important and very interesting paper, especially when it comes to strengthening existing early warning systems around the world. Estimating the impacts of weather-related activities (in this case agriculture) will be an invaluable tool for many NGOs and other institutions that aim to mitigate the impact of weather-related disasters. This new framework allows to determine agricultural risk and forecast crop yield outcomes before and during the season. The fact that it can continuously be updated with observed data, and thus reduce uncertainty, is very powerful. And another important result shown here (and not really highlighted by the authors is that the yield can be estimated about 6 weeks prior to harvest.

Specific comments:

- The whole paper is focused on 'low' yield or 'adverse events'. But what about taking advantage of good seasons? There is value in predicting a good season and TAMSAT ALERT can be used in these scenarios.

- The authors set up the system using national data but then somehow only focus on Northern Ghana, while specifying that they do not have yield data for that region. There is mention of Tamale but without clarifying where that is, and what the agricultural practices are in this town/region. This is all rather confusing and it would be good if the authors could somehow clarify this issue.

- Seasonal forecasts do come with uncertainty and it would be good to at least discuss the impact of forecast skill on these results.

- Similarly, agricultural data have some uncertainty, as the authors have indicated in line2 page 5. Discussing the impact on calibrating a crop model using FAO data and thus the impact on the outputs of TAMSAT ALERT should be discussed. Especially, now there is a clear understanding that crop models should not be taken individually (e.g., AgMIP). Additionally, the sensitivity of GLAM to planting/harvest dates could have been included as well. All of this should at least be clearly discussed.

- the authors mention that the forecast is very similar to the climatology, which then obviously results in no clear additional information from the forecast. So, unless I have misunderstood something, I do not believe that the authors can then clearly say that there is limited value in seasonal forecasts. Ideally, and in order to make a clear suggestion on the usefulness of forecasts, the authors should have used several forecasts that use a variety of tercile distributions. So I encourage the authors to be more cautious with their result descriptions.

- the authors focused on 2011 to evaluate this framework. From Fig 5 one can see that GLAM is able to clearly estimate the yield in that year. Is there a way to provide a similar analysis for 2010 where GLAM underperforms? And maybe include more discussion on what the decision-maker needs to do when the year-to-year estimation

of this system is only 'moderate'.

- when including forecast (section 3.3.2), it is unclear whether all forecasts are included simultaneously (i.e., in June, do the authors include forecasts for JJA, JAS, ASO and SON or do they only include JJA and climatology for the rest of the season? Also, is there scope to include both the temperature and rainfall forecasts at the same time?

- And finally, it would have been good to see a quick statistical analysis on the usefulness of the forecasted variables in predicting maize yields in Ghana (i.e. run a multiple linear regression on yield=f(seasonal rainfall, seasonal mean temperature)). This could also provide more arguments while discussing the value of seasonal forecasts.

- As mentioned before, one key result here is that by using climatology alone, in that one year, TAMSAT ALERT can predict maize yields 6-8 weeks ahead of harvest. This is extremely useful for decision makers and a point that should be highlighted more in this paper.

All these points should be included somehow in this paper, they may not all require additional processing and can somehow just be included into the discussion section. And as such, the abstract will then also need to changed.

Technical comments:

page 1 line 13: change to 'which aims to provide early warning'

page 3 line 2: should the question only focus on 'adverse events'? or should it be more general? line 15: again, why focus on 'unfavourable' conditions? line 19: 'to assign that assign' rewrite Figure 1: again focus on 'adverse events'. Overall, figure 1 could be improved so that it clearly highlights all the steps mentioned in 2.2

page 4 line 19: no space between base and line

page 5 line 11: what is the metric period? line 13: remove TAMSAT ALERT line 18: us " for file name line 22: what is ECDF? line 26: use " for file name, and remove comma

after <year>

page 7: line 4: no 'amount of yield' in figure. What is that anyway Figure 3: can you explain the peak in 2002? Figure 4: use same y scale as fig 5

page 9 line 26: no need to write again what WFDEI stands for

page 10 lines 5-6: do you have info on all these other suggested factors?

page 12 (and beyond) you have forgotten to include figure numbers throughout figures 8, 9, 10 all show the same thing, consider using only one Figure 11: not sure what the rationale is to use these dates but I would guess that your figure for Sept 15 would be similar to the one for Oct 4th, and it would indicate the 6-8 week lead time in forecasting yields.

page 16 lines 3-5: this may be simply due to the fact that early season rainfall may have limited impact on yields (something that could technically be evaluated statistically, or at least acknowledged)

page 17 line 13: again, and as mentioned before, it is rather confusing to set the system up for all of Ghana and then only use data for Northern Ghana. Would there be a way to include forecasts for all of Ghana? Fig 17 and 18: they all have different time scales (and fig 4), add why that is.

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