Hydrol. Earth Syst. Sci. Discuss., 10, C7952–C7956, 2014
www.hydrol-earth-syst-sci-discuss.net/10/C7952/2014/

Hydrology and Earth System Sciences
Discussions

Interactive comment on "The potential value of seasonal forecasts in a changing climate" *by* H. C. Winsemius et al.

H. C. Winsemius et al.

hessel.winsemius@deltares.nl

Received and published: 20 February 2014

Referee no. 1 has provided us with useful comments, that will strengthen this manuscript. In particular the discussion on value of forecasting in relation to other possible adaptation strategies of farmers can be discussed more elaborately in the manuscript. Below we answer the main comments of referee no. 1. After the main comments, we address the specific comments on the manuscript, brought forward.

will the forecasting system continue to behave in the future as it has in the past?

The way we interpret the comment of the referee is that changes in climate may alter the predictability of seasonal forecasts (i.e. in some areas seasonal forecasts may become more skillful, e.g. because well represented system phenomena in the fore-

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

casting system may occur more frequently under changing climate, while in other regions they may become less skilful). It should be noted that forecast skill has steadily increased over the past decades which also experienced climatic variability, currently we do not have reasons to believe that this would be otherwise in the future. We have identified this issue in section 4.3.4 and propose to list potential future changes that may affect the predictability of the forecasting system. It remains however difficult if not impossible to analyse the true impact of such changes on forecastibility, simply because the changes have not occurred yet. We can therefore not do more than highlight the possible factors affecting changes in predictability.

The justification of the study appears to be the argument that (a) climate is likely to change, (b) forecasts with some skill appear possible and "therefore" (c) forecasts are going to be more important in future. The logic of a+b -> c is poorly developed and not immediately obvious to me.

The referee suggests a number of reasons why a+b is not necessarily c. We fully acknowledge that this is true and in particular, other adaptation measures such as a change in crop types and live stock may (and will) be considered by farmers in the Limpopo basin and surroundings. In fact, it is likely that adaptation to climate change will consist of a large number of adaptation measures, implemented across different levels within the society. Forecasting is just one of such adaptation measures. But nevertheless, even if other adaptation strategies are followed, our analysis demonstrates that forecasts (possibly along with these other measures) will be beneficial to the farmers in the region. For example, if a farmer decides to switch to a more drought resistant crop due to climatological changes in seasonal rainfall and the frequency of dry spells, still, the farmer may benefit from skillful forecasts when a dry condition (erratic rainfall, dry spells) is forecast with skill. The farmer may however choose a different threshold upon which to act with a mitigation measure during the season (e.g. instead of a dry spell of 10 days, the farmer should worry about a dry spell of 15 days). We will elaborate more on this in the introduction section and add a subsection to the discussion to

HESSD
10, C7952–C7956, 2014

put the benefit of seasonal forecasts more in context with other adaptation measures.

Specific comments:

Title: include mention of southern Africa? Ok, we will add Southern Africa to the title

14751/12-14) This raises the question of stationary within the context of the forecasting method (see main general comment 1). Please briefly review and discuss most tenuous assumptions.

We will modify so that the assumptions of stationarity of the predictability of seasonal forecasts, used in this study are more clear.

14753/22-23 and 14754/15: for the sake of reproducibility please provide details as to where /how one can obtain (or apply to obtain) each of the data sets used.

There is currently no publicly available archive of ECMWF seasonal forecasts, Please visit www.ecmwf.int for access conditions. ECMWF is currently embarking on an activity called S2S, which is similar to the TIGGE website (tigge-portal.ecmwf.int/âĂŐ). We have no resources to provide data derived from the seasonal forecast online and support their public usage. Please contact us if you want to have access. In the case of forecasts issued by the CSIR for southern Africa, many may be accessed via the Weather and Climate portal of the Risk and Vulnerability Atlas. Validation and hindcasting is also typically available.

14756/8) 3 and even 5 or 10 days seem rather short for a dry spell – they must be very common? Pls discuss and provide some justification as at face value it would strike me as at the low end of being useful... Also, how are carryover spells from one month to the next dealt with?

We did not go above 10 day dry spells because the amount of samples within a season would reduce to a too low number to provide a statistically robust figure. A 10-day dry spell however, is known to be a serious issue for crops such as maize. This threshold is also used by e.g. Barron et al. (2003).We will add this reference on page 14756, line

HESSD

10, C7952–C7956, 2014

10.

14757/25-26) see general comment 2.

As mentioned, we will address this in our discussion.

14762/12-13) Non sequitur, see general comment 2.

Ok, we will discuss that the definition of critical weather may change, given other adaptation measures.

14763/1-3) see general comment 2. Also, that forecasts might be available does not necessarily mean that the livestock sector will be able to use the forecasts... In fact the next page (14764/2-3) you give some good examples why it might not.

We agree of course, but like to emphasize that the fact that farmers have difficulty accessing or using forecasts, this does not bring down the conclusions of our paper.

14765/24-26 and 3 lines next page) Indeed this is a very important point that needs a much more stronger caveat and careful discussion, see general comment 1. There have just been some more high-profile papers published on the apparently changing nature of ENSO and therefore there appears to be plenty of potential for non-stationarity in the assumed boundary conditions of your forecast method. Just to say that "we believe that possible changes .. will not change the conclusions" is too facile.

We agree, and unless the circulation patterns completely change there will still be ENSOs in the future. Since ENSO is a strong predictor in Southern Africa, this means that there will also be predictability. The current signal is that El Nino events will become more frequent in a future climate and that variability in ENSO will increase (see e.g. IPCC, 2013 and Power et al., 2013). This would imply that predictability will also increase across the S-A region. We can of course never fully corroborate that predictability will increase in the future until we have reached the future state, but there is no reason to assume that it will become worse, given the above-mentioned facts as well as the fact that weather simulations have improved substantially over the past

HESSD

10, C7952–C7956, 2014

decades anyway. We will add the mentioned references to our paper.

TECHNICAL CORRECTIONS 14749/27 (page/line) "significantly up to 20%" rephrase avoiding this term with statistical connotations. We are not sure what the referee requests. We can leave out the term significantly, assuming that the referee is referring to this word.

14752/13) units of kt (kilotonnes) might be more readable. Ok

14753/3) change to '6 to 12' assuming you don't mean 6/12=0.5 months ahead. Ok

Additional references

IPCC. Summary for Policymakers. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge University Press, Cambridge, United Kingdom and New York, NY, 2013)

Power, S., Delage, F., Chung, C., Kociuba, G. Keay, K. Robust twenty-first-century projections of El Nino and related precipitation variability. Nature, 502, 541-545, doi:10.1038/nature12580 (2013)

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 14747, 2013.