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Interactive comment on "Season-Ahead Forecasting of Water Storage and Irrigation Requirements – An Application to the Southwest Monsoon in India" *by* Arun Ravindranath et al.

Anonymous Referee #1

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General response. This is a well-written paper that develops and demonstrates a framework for season-ahead forecasts of an irrigation-relevant index, the CDI. Although there have been other studies examining season-ahead forecasting for the agricultural sector, the significance of this paper is the demonstration of the forecasting of a decision-relevant index, rather than routinely forecasted products, such as precipitation. I recommend the paper for publication, with a few minor revisions for consideration by the authors:

1. General comment for Section 4. This section is well written, but is quite dense, making it hard to follow each step. I suggest adding a flow chart detailing the main

steps (along with the associated section #), to help the reader follow along.

1.a. Related to this point, in section 4.2.1. "Predictor Selection" I was not clear if there was any consideration for having more versus less predictors, especially since these would likely be co-linear; i.e., your best model includes Niño 12 MAM-DJF, Niño 34 MAM-DJF, and ITF. It would seem like these would have similar information, though I recognize that this is a data-driven approach (i.e., is ultimately used in the feature vector in the knn, not linear regression). Was there any penalty calculated in your metrics (i.e., RMSE and RPSS) for including additional predictors?

2. General comment for section 5.1. Your evaluation of the forecasts is effective (e.g., Figure 4, and Tables 1 & 2), especially when you compare with the precip forecasts (Table 3).

2.a. Minor comment related to this point: Figure 4 & Line 562. If possible, maybe have a color coding or symbol of the triangles to indicate the directional similarity? And add a legend to that effect? Otherwise this is hard to see. At first glance, I was looking to see if the observation was captured by the IQR.

2.b. Table 3 and lines 611. Agreed that it is important to note that your forecasts are tailored to the location, which is quite resource intensive to do for every crop, and every location. I agree that this is where a framework (such as what you have put forth) is helpful, but it may be worth highlighting that there is a rich literature on opportunities and barriers to using seasonal forecasts (see next comment: 3. General comment for section 5.2).

3. General comment for section 5.2. It is useful to provide a discussion of the utility of such forecasts. Targeted forecasts, such as those presented here, can help to increase the utility of the forecasts since they intersect with actual decision contexts (e.g., irrigation needs for particular crops). It would also be worth mentioning (briefly) that there have been studies on developing useable climate information, and mention how this study fits into that bigger picture. Dilling and Lemos (2011) have a good overview

of some of the opportunities and barriers to the use of seasonal climate forecast information (but there are other studies), which might be of interest to that end. Dilling, L., & Lemos, M. C. (2011). Creating usable science: Opportunities and constraints for climate knowledge use and their implications for science policy. Global Environmental Change, 21(2), 680–689. http://doi.org/10.1016/j.gloenvcha.2010.11.006

Other Minor comments:

Line 208: Any prior studies/experience/justification for this selection?

Next time, please put the captions beneath each figure for ease of reading.

Figure 2 – What is CWSI (plot title)? Also, the x-axis does not seem to line up properly. I see the local smoother trends indicating the variability. Did you test to see if there is any monotonic trend over the time series? From the figure it seems like recent years may be pulling it down towards a negative trend (but perhaps not stat significant). Just curious, as this might be relevant to calculating the anomalies (e.g., line 539, the anomalies being estimated from the 1901-2013 mean).

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2018-183, 2018.