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Interactive comment on "An experimental seasonal hydrological forecasting system over the Yellow River basin – Part II: The added valuefrom climate forecast models" *by* Xing Yuan

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I find this study very well carried out and the paper very well written. Following the Part I of the study, the author investigated how much extra forecast skill the NMME ensembles can provide relative to the baseline statistical forecast (ESP) which relies on the initial hydrologic conditions only (no information from dynamic forecast). To my knowledge, NMME has not been looked at over the study area here, the Yellow River basin, and I think the study presented here offered a lot of new insights about NMME and seasonal scale hydrologic forecast in general. So I think the work here is more than enough significant for being considered published at HESS. The analysis in the paper is focused on the two main drivers for surface hydrology, precipitation and air

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temperature, as well as two key hydrologic variables, soil moisture and river streamflow. A land surface model (VIC) and a river routing model were used to derive the surface hydrologic fluxes/states. The author also applied a number of important techniques like downscaling, bias correction, and post-processing in an effort to maximize the accuracy and skill of the final hydrologic forecasts. There is a solid amount of careful experiments and analyses. Besides the scientific quality, the author has also done a good literature review and the presentation is also well organized.

Response: We would like to thank the reviewer for the compliment and recognizing the value of our work. The thoughtful comments have helped improve the manuscript. The reviewer's comments are italicized and our responses immediately follow.

My main concern is about the technical details of the analysis. The main skill metric used is the Anomaly Correlation, defined in Equation (1) on page 6, as the correlation calculated over both time and space. I think the author needs to offer some reasoning to back up such a definition. Normally, the skill can be defined as the correlation between forecasts and observations in time only. Why to lump all locations together calculating the correlation? Why not calculate the correlation over different locations first and then average them up? I guess that the short length of the data records (29 years) might be a factor which makes the correlation calculations less robust. The current definition lumps all locations together and it is hard to distinguish between NMME's ability to resolve the dynamics in time and space. Because of that, I can't quite interpret some of the discussions later, for example, about the significance of low correlation in lines 5-8 on page 7. If we calculate the correlation over 38309 samples, then the correlation includes both those in time and space ... and in which part shall we measure the forecast skill?

Response: Thanks for the comment. The anomaly correlation (AC) that assesses the performance both in space and time is widely used in the evaluations of the hydro-climate forecasts (Becker et al., 2014; Saha et al., 2014; Mo and Lettenmaier, 2014; Ma et al., 2015). The use of the AC facilitates the presentation of the results for different target months over different lead times in a single plot (e.g., Figures 1 and 2). Of course, it can also be reduced to the pearson correlation (time) or the pattern correlation (space). For example, Figure 3 shows the temporal part of the AC for the precipitation forecasts over different locations. As pointed out by the reviewer, the short length of the data records (29 years) might be a factor which makes the temporal correlation less robust. The AC samples the forecasts both over space and time, and it can be regarded as an integral measure of the performance. To clarify it, we will revise the manuscript as follows: "The AC is widely used the hydro-climate forecast evaluations (Becker et al., 2014; Saha et al., 2014; Mo and Lettenmaier, 2014; Ma et al., 2015), and can be regarded as a measure of forecast skill both in space and time. If the AC is used for each grid cell within the Yellow River basin (i.e., there is only a summation over time), it is reduced to the Pearson correlation. And if the AC is used for each year, it is reduced to the pattern correlation."

Also, a very minor point – can you show an example of the hydrological postprocessing? For example, to the time series of the raw, post-processed, and observed streamflow at one gauge? Did you train the regressions using data over the same period of 1982-2010 or a different period?

Response: Thanks for the comment. We will clarify it in the revised manuscript as follows: "In this study, a linear regression is applied to correct the streamflow forecasts at 12 mainstream gauges where the observations are available. For each gauge, the regression coefficients are firstly fitted between observed and offline simulated streamflow for each calendar month to account for the seasonality in the human water usage, then the coefficients are applied to correct the streamflow forecasts for their target months. In this study, the coefficients are estimated during 1982-2010 in a cross validation mode (i.e., dropping the target year)."

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