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Interactive comment on "Developing a hydrological monitoring and sub-seasonal to seasonal forecasting system for South and Southeast Asian river basins" *by* Yifan Zhou et al.

Anonymous Referee #2

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The article entitled "Developing a hydrological monitoring and sub-seasonal to seasonal forecasting system for South and Southeast Asian river basins" develops a sub-seasonal to seasonal hydrological forecasting system for South and Southeast Asia (SAHFS-S2S). The system applies the NoahMP land surface model, driven by CHIRPS for monitoring and driven by GEOS-S2S for forecasting. The system shows skillful predictions of root zone soil moisture one or two months in advance when initialized in rainy seasons and up to 8 months when initialized in dry seasons, due to the contribution from initial conditions. The results could provide end-users with water resources information to help manage local drought risks. It is an interesting study, and the paper is easy to follow. However, the conclusion of "the impact of initial conditions on

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Discussion paper

forecast skill depends on initialized dry/wet seasons" has been presented in previous researches. What's innovation in this paper except for the different study regions?

Refer to Yuan, X., F. Ma, L. Wang, et al., 2016: An experimental seasonal hydrological forecasting system over the Yellow River basin-Part 1: Understanding the role of initial hydrological conditions. Hydrology and Earth System Sciences, 20, 2437–2451. Luo, L., Sheffield, J., and Wood, E. F.: Towards a global drought monitoring and forecasting predictability, NWS Science & Technology Infusion Climate Bulletin, 2008. Shukla, S. and Lettenmaier, D. P.: Seasonal hydrologic prediction in the United States: understanding the role of initial hydrologic conditions and seasonal climate forecast skill, Hydrol. Earth Syst. Sci., 15, 3529–3538 Ma, F., Luo, L., Ye, A., et al. Seasonal drought predictability and forecast skill in the semi-arid endorheic Heihe River basin in northwestern China, Hydrol. Earth Syst. Sci., 22, 5697–5709, 2018.

The GEOS-S2S forecasts have been downscaled and bias-corrected before driving the hydrological model. Please added some more details of the downscaling algorithm and the performance before and after bias-corrected.

The impact of initial conditions is analyzed using the difference between hindcast-RIC and hindcast-CIC simulations. While many studies have analyzed the role of initial conditions by two experiments: Ensemble Streamflow Prediction (ESP) and reverse-ESP (revESP). Some discussion regarding the difference between them may be added.

Minor comments Line 40: The meaning of the sentence "The forecast period ... in recent years" is not well understood. Line 44: What is "land component". Line 46: The sentence "The influence of initial hydrological ..." is repeated. The depth of root zone soil moisture is 1 m? Some figures, such as Fig. S1, S3, S6, S7, in supplement information are not mentioned in the paper. The ESA-CCI SM derived from remote sensing observation has many missing data, so how to deal with the missing data? In data section, many datasets are used. Here, I suggest that a data table, including data sources, detailed information and variables used, should be listed for easily read. Hu-

man activities, such as irrigation, has great influence on soil moisture, how to consider irrigation in the NoahMP land surface model? Line 330: Please add a figure of monthly evapotranspiration (ET) for easily explaining. Line 780: Figure 7: The difference is computed as correlation between RIC and CIC? In the Case Study of the 2015 South and Southeast Asia section, I suggest a spatial distribution map showing the comparation of drought conditions between retrospective simulation and hindcast ensemble mean may be added. Figure 9: the tittle of right subplots should be (b), (d), (f).

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