

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
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Comment on hess-2022-58

Anonymous Referee #1

Referee comment on "Quantifying overlapping and differing information of global precipitation for GCM forecasts and El Niño–Southern Oscillation" by Tongtiegang Zhao et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-58-RC1>, 2022

This is an excellent and interesting study. The authors have adequately addressed all the comments raised by previous reviewers.

Just one minor point. I think in the Introduction, the authors should appreciate the latest advances in the seasonal hydroclimate forecast using hybrid dynamic-statistical approaches, such as Wanders et al. (2017). Seasonal forecast is also key for drought impact reduction, e.g., related to food security and water resources management (He et al., 2019; Sheffield et al., 2014; He et al., 2021).

Ref:

He, X., Estes, L., Konar, M., Tian, D., Anghileri, D., Baylis, K., Evans, T.P. and Sheffield, J., 2019. Integrated approaches to understanding and reducing drought impact on food security across scales. *Current Opinion in Environmental Sustainability*, 40, pp.43-54.

Wanders, N., Bachas, A., He, X.G., Huang, H., Koppa, A., Mekonnen, Z.T., Pagán, B.R., Peng, L.Q., Vergopolan, N., Wang, K.J. and Xiao, M., 2017. Forecasting the hydroclimatic signature of the 2015/16 El Niño event on the Western United States. *Journal of Hydrometeorology*, 18(1), pp.177-186.

Sheffield, J., Wood, E.F., Chaney, N., Guan, K., Sadri, S., Yuan, X., Olang, L., Amani, A., Ali, A., Demuth, S. and Ogallo, L., 2014. A drought monitoring and forecasting system for sub-Saharan African water resources and food security. *Bulletin of the American Meteorological Society*, 95(6), pp.861-882.

He, X., Bryant, B.P., Moran, T., Mach, K.J., Wei, Z. and Freyberg, D.L., 2021. Climate-informed hydrologic modeling and policy typology to guide managed aquifer recharge. *Science advances*, 7(17), p.eabe6025.

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
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Comment on hess-2022-58

Anonymous Referee #2

Referee comment on "Quantifying overlapping and differing information of global precipitation for GCM forecasts and El Niño–Southern Oscillation" by Tongtiegang Zhao et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-58-RC2>, 2022

This manuscript develops a novel Set Operations of Coefficients of Determination (SOCD) method to explicitly quantify the overlapping and differing information for GCM forecasts and ENSO teleconnection. The proposed method and its case study are interesting and well presented. I have some comments, especially concerning the conclusions derived from the case study.

- This study derives the patterns from CFSv2 forecasts and observations. However, we should note that the forecast skills of GCMs are of high uncertainty in different models. The ability of GCMs in capturing ENSO-related climate dynamics are different. Therefore, the results and conclusions may be different when other GCMs are used. The authors should have a more detailed discussion on this issue.
- Another issue is that the lagged relationship between ENSO and seasonal precipitation that always matters. The lagged climate indices have been widely used as predictors in previous studies. In this study, the concurrent relationship between ENSO and seasonal precipitation is analyzed. We suggest that the lagged relationship should also be discussed.
- The SOCD method uses three classic simple linear regression models to account for the information of observations in forecasts and nino3.4 index. However, this assumption may not be sufficient. The linear regression may lose some important information, especially for extreme seasonal precipitation events. This should be discussed in the discussion section as well.