

With my own interest in Indian monsoon prediction and predictability, I read the manuscript with interest. The manuscript addresses an important and timely issue concerning the potential predictability limit (PPL) of the seasonal monsoon and the inherent challenges associated with the ‘perfect model’ framework. The question of how far seasonal climate, particularly Indian summer monsoon rainfall, can be predicted remains a subject of active debate. The study is highly relevant to the climate dynamics and prediction community, with potential implications for both advancing scientific understanding and improving operational forecasting. Overall, the manuscript is well-structured, presents new insights, and uses a comprehensive set of model simulations. I am happy to recommend the manuscript for publication after minor revision.

Strength:

- 1) In the perfect model framework, signal and noise component of a parameter is estimated, assuming that ensemble spread is due to initial error, which is more appropriate for short-range forecast (e.g. weather), but may not hold true for long-range forecast (i.e. seasonal), where noise/error introduced by slowly varying boundary conditions are also important. Therefore, estimates of PPL for seasonal climate in this framework may not represent the true limit, which is all about paradox here.
- 2) Figure 7 shows an important aspect: how the internal variability could contribute to the prediction skill/predictability of ISMR. However noise component is fully attributed to initial error in ‘perfect model’ assumption.
- 4) Although signal and noise are estimated under the assumption of orthogonality, it is clear that this assumption does not always hold.
- 3) Interestingly, proposed method of estimating PPL and ANOVA based PPL are similar in their maximum predictability of rainfall over tropical Pacific region and more importantly free from paradox.

Weakness:

- 1) PPLs are model dependent, improvements in model likely to increase the limit. Longer observations may be required to estimate actual PPL.

Suggestions:

- 1) For readers from other domain, some basic discussions, like what is the basic premise/hypothesis of the ‘perfect model’ framework while using ensemble forecast is required.
- 2) The estimate of PPL by using a seasonal prediction model from a large ensemble of hindcasts by choosing the ensemble mean of ‘best’ initial conditions may be acceptable. However, the manuscript does not provide a discussion on how to realise the PPL in operational framework. It is possible that growth of ‘initial error’ may never allow the model to achieve the PPL. Even if we knew what are the ‘best initial conditions’ in the ensemble, it would lead to overfitting and unreliable forecast. A discussion on how the PPL could be achieved either by tradition methods or by a deep learning/AI model trained on the large ensemble of hindcast experiments would significantly enhance the quality of the manuscript.