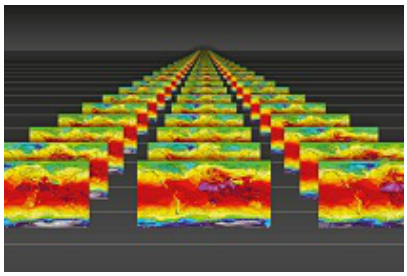

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A verification framework for South American sub-seasonal precipitation predictions

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We propose a verification framework for South American sub-seasonal (weekly accumulated) precipitation predictions produced one to four weeks in advance. The proposed framework assesses both hindcast and near real time forecast quality focusing on a selection of the most fundamental attributes (association, discrimination, reliability and resolution). These attributes are measured using various deterministic and probabilistic verification scores. Such an attribute-based framework allows the production of verification information in three levels according to the availability of sub-seasonal hindcasts and near real time forecasts samples. The framework is also useful for supporting future routine sub-seasonal prediction practice by helping forecasters to indentify model forecast merits and deficiencies and regions where to best trust the model guidance information. The three information levels of the proposed framework are defined according to the verification sampling strategy and are referred to as target week hindcast verification, all season hindcast verification, all season near real time forecast verification. The framework is illustrated using ECMWF sub-seasonal precipitation predictions. For the investigated period (austral autumn), reasonable accordance was indentified between hindcasts and near real time forecast quality across the three levels of verification information produced. Overall, sub-seasonal precipitation predictions produced one to two weeks in advance presented better performance than those produced three to four weeks in advance. The northeast region of Brazil consistently presented favorable sub-seasonal precipitation prediction performance through the computed verification scores, particularly in terms of association and discrimination attributes. This region was therefore identified as a region where sub-seasonal predictions produced one to four weeks in advance with the ECMWF model are most likely to be successful in South America. When aggregating all predictions over the South American continent the probabilistic assessment showed modest discrimination ability, with predictions clearly requiring calibration for improving reliability and possibly combination with predictions produced by other models for improving resolution. The proposed framework is also useful for providing feedback to model developers in identifying strengths and weaknesses for future sub-seasonal predictions systems improvements.

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