

Real-time experimental extended range forecast system for Indian summer monsoon rainfall: a case study for monsoon 2011

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Abstract

The variability of Indian summer monsoon rainfall (ISMR; both at interannual as well as intraseasonal timescales) has a direct impact on various sectors of public interest and economy such as agriculture, water resource, etc. So, the need of real-time extended range forecast system of the ISMR (monthly to seasonal scale) is not overstated. The present study is aimed at developing such a forecast system to predict rainfall (monthly and seasonal mean) one month in advance over 34 meteorological subdivisions of India for climate risk management in agriculture. Three different statistical approaches, viz. singular value decomposition-based multiple regression, supervised principal component regression and canonical correlation analysis are applied on rainfall products obtained from eight global models. The hindcast (1982–2010) skills of all the three methods are found to be better than the simple ensemble mean of all models for all- India level. However, a large variation in the skill of each of the techniques is noticed when studied over smaller regions, i.e. at meteorological subdivision level. Therefore, a combination of all the three methods has been developed for real-time experimental forecast of rainfall. In order to incorporate uncertainties in the predictions, the final forecast is also prepared as probability values. These extended range predictions have been evaluated for the monsoon-2011 against India Meteorological Department observed rainfall. It is found that the extended range experimental forecasts of rainfall are usable for more than 50% of the meteorological subdivisions as well as the whole of India at monthly and seasonal scale.