Developing Multi-model Ensemble for Precipitation and Temperature Seasonal Forecasts: Implications for Karkheh River Basin in Iran

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Water resource managers can utilize reliable seasonal forecasts for allocating water between different users within a water year. In the west of Iran where a decline of renewable water resources has been observed, basin-wide water management has been the subject of many inter-provincial conflicts in recent years. The problem is exacerbated when the environmental water requirements is not provided leaving the Hoor-al-Azim marshland in the downstream dry. It has been argued that information on total seasonal rainfall can support the Iranian Ministry of Energy within the water year. This study explores the skill of the North America Multi Model Ensemble for Karkheh River Basin in the of west Iran. NMME seasonal precipitation and temperature forecasts from eight models are evaluated against PERSIANN-CDR and Climate Research Unit (CRU) datasets. Analysis suggests that anomaly correlation for both precipitation and temperature is greater than 0.4 for all individual models. Lead time-dependent seasonal forecasts are improved when a multi-model ensemble is developed for the river basin using stepwise linear regression model. MME R-squared exceeds 0.6 for temperature for almost all initializations suggesting high skill of NMME in Karkheh river basin. The skill of MME for rainfall forecasts is high for 1-month lead time for October, February, March and October initializations. However, for months when the amount of rainfall accounts for a significant proportion of total annual rainfall, the skill of NMME is limited a month in advance. It is proposed that operational regional water companies incorporate NMME seasonal forecasts into water resource planning and management, especially during growing seasons that are essential for agricultural risk management.