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Variability assessment of Irrigation Requirement for Winter Wheat Cropping Under Changing Climate.

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India is primarily an agronomic country and most of the cropping in the Rabi season depends on the rainwater availability. With the ill effects of climate change cropping up, the agriculture sector is expected to take a major hit. This study takes a technical approach on the impact of climate change on the irrigation requirement of wheat cropping by studying the future irrigation requirement based on the temperature and rainfall that can be expected to occur in the future timelines. A root water uptake model involving the solution of the non-linear Richards equation to assess the root-zone moisture movement is formulated and validated. The inputs of the model include the crop data, which, in this case is obtained by field experimentation at the irrigation field laboratory at IIT Roorkee and weather data, which is obtained from the CANESM2 General circulation model for the historical and projected timescales. The historical GCM data for thirty years is bias corrected using the observed data from the India Meteorological department (IMD). The validated root water uptake model is applied to the historical and projected data for a 60 year span for two emission scenarios for RCP 4.5 and 8.5. The output was obtained as soil moisture profiles and frequencies of irrigation required. It was seen that for both the mild and high emission scenarios, the number of irrigation events per cropping period increased. This increase is assessed using variability analysis and for its impacts on the water resources management systems. The variability assessment showed the variation of the irrigation water requirement on annual and decadal scales. This is useful in understanding the historical and expected crop water requirement in view of the climate change effects.