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# Effects of GCM uncertainty on climate change impacts on regional hydrology of the river Derwent catchment

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The 21st century would be anticipating rigorous adaptation strategies to build proper climate resilient and resistant regional economy. Therefore the Recent years have witnessed a great attention from the policy makers and water industries on the climate change impacts on fluvial and regional catchment hydrology. This study examines the impact of uncertainties related to GCMs on hydrological response of the upper river Derwent catchment in the Yorkshire region of Northern England. For this purpose, a conceptual monthly hydrological model (an auxiliary-HyMOD model) is calibrated on 5km2 gridded UKCP09 data averaged within the range of catchment co-ordinates. The auxiliary-HyMOD has been calibrated and bias corrected using a novel concept Shuffled Complex Evolution Metropolis Algorithm (SCEM-UA) and event bias correction method respectively. The future hydrological simulations for the time instants like 2020s, 2050s and 2080s were performed using the spatially downscaled ($\sim$5km2) UK Meteorological Office's Hadley Centre Coupled Model (HadCM3) and Canadian Centre for Climate Modelling and Analysis (CCCMA) models simulated at climate change scenario of IPCC SRES A2a. The results showed that the average monthly discharges are expected to change considerably during the summer and autumn seasons. The simulations with systematic ensembles of GCM derived regional climate variables have shown higher ranges of uncertainty during the winter seasons with higher values associated with the December month of all three simulation periods for both HadCM3 and CCCMA. The results from these two GCMs have shown significant seasonal disparity in simulations during winter and spring seasons during simulation periods like 2020s, 2050s and 2080s.