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Bias Correction of Global Climate Models' data within the framework of HAPPI project

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In its landmark Paris Agreement of 2015, the Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC) invited the IPCC to prepare a special report "on the impacts of global warming of 1.5°C above pre-industrial levels and related greenhouse gas emission pathways" by 2018. Unfortunately, most current experiments (including Coupled Model Inter-comparison Project (CMIP)), are not specifically designed for making a substantial contribution to this report. To fill this gap, the HAPPI (Half a degree Additional warming, Projection, Prognosis and Impacts) initiative has been designed to assess climate projections, and in particular extreme weather, at present day and in worlds that are 1.5°C and 2.0°C warmer than pre-industrial conditions.

Output from the global climate models is prone to many systematic biases making them unsuitable to use directly to force impact models. Therefore, bias correction techniques are generally used to remove or reduce these biases. Here we present the performance of ISIMIP2b (Inter-Sectoral Impact Model Intercomparison Project phase 2) bias correction technique in correcting 8 variables simulated under HAPPI project using 4 different GCMs. We have employed various analysis measures including mean seasonal differences, ensemble variability, annual cycles, extreme indices as well as a global hydrological model to judge the performance of ISIMIP2b bias correction technique. We have witnessed a marked improvement in all these parameters after the application of bias correction. Moreover, distinct improvements in the simulation of discharges after bias correction point towards the added value of using the bias corrected data in impact models. Therefore, we conclude that bias corrected HAPPI data can provide a reliable basis for sectorial climate impact projections.