Scaled distribution mapping: a bias correction method that preserves raw climate model projected changes

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Commonly used bias correction methods such as quantile mapping (QM) assume the function of error correction values between modelled and observed distributions are stationary or time-invariant. This article finds that this function of the error correction values cannot be assumed to be stationary. As a result, QM lacks justification to inflate/deflate various moments of the climate change signal. Previous adaptations of QM, most notably quantile delta mapping (QDM), have been developed that do not rely on this assumption of stationarity. Here, we outline a methodology called scaled distribution mapping (SDM), which is conceptually similar to QDM, but more explicitly accounts for the frequency of rain days and the likelihood of individual events. The SDM method is found to outperform QM, QDM and detrended QM in its ability to better preserve raw climate model projected changes to meteorological variables such as temperature and precipitation.