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Can seasonal forecast reliability calibrate climate change projections?

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High-resolution climate models generally better simulate the 20th Century Climate than low-resolution models because model biases are often reduced with higher resolution. But what is the impact of model bias on climate change projections? In this study, 20th Century simulations and time-slice projections have been conducted with MRI-AGCM3.2 at two different horizontal resolutions - a resolution typical of contemporary climate models (180-km) and a resolution typical of contemporary numerical weather prediction (20-km). The high-resolution model is treated as a surrogate of "truth", for both 20th and 21st Century climates (1979-2003 and 2075-2009). We focus on climate change signals of precipitation, and investigate whether seasonal predictions done with the low-resolution model can calibrate probabilities of wet and dry seasons in the 21st Century runs with the low-resolution model. For this, 4-month seasonal retrospective predictions have been conducted with the low-resolution model using prescribed observed SST and sea ice over the period 1979-2003. The 21-member seasonal predictions have been initialised with Japanese reanalyses on around the 1st May and 1st November for JJA and DJF, respectively, and have been verified against the high-resolution model ("truth"). We find that model biases have some nonlinear influences on climate change projections and therefor climate change projections from a biased model should be calibrated. Regression lines of reliability diagrams from seasonal predictions can be a useful tool to calibrate the low-resolution probabilities of wet and dry seasons for most of the global land regions, although the calibration coefficient for the probabilities derived from the slope of the regression line should be to some degree reduced. Our analysis suggests that reductions in model biases on the seasonal timescale can lead to more accurate climate change projections.