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## Global surface air temperatures in CMIP6: Historical performance and future

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Surface air temperature outputs from 16 global climate models (GCMs) participating in the sixth phase of the Coupled Model Intercomparison Project (CMIP6) were used to evaluate agreement with observations over the global land surface for the period 1901–2014. Projections of Bayesian model averaging (BMA) multi-model ensembles under four different Shared Socioeconomic Pathways (SSPs) were also examined. The results reveal that the majority of models reasonably capture the dominant features of the spatial changes in observed temperature with a pattern correlation typically greater than 0.98. However, most models underestimate annual temperature over northeastern North America and overestimate it over central Eurasia. In addition, most CMIP6 models overestimate the warming trend in most regions. The BMA multi-model ensembles show more agreement than individual models do in simulating the spatial patterns of the temperature, but with less spatial variability compared with the observations. In the 21st century, temperature is generally projected to increase over the global land surface under all four SSP scenarios. By the end of the 21st century, temperature is projected to increase by 1.35 °C/100 yr, 3.61 °C/100 yr, 6.39 °C/100 yr and 8.03 °C/100 yr under the SSP1-2.6, SSP2-4.5, SSP3-7.0 and SSP5-8.5 scenarios, respectively, with greater warming projected over the high latitudes of the northern hemisphere and weaker warming over the tropics and the southern hemisphere.