



## **Paleoclimate diagnostics: consistent large-scale temperature responses in warm and cold climates**

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The CMIP5 model simulations of the large-scale temperature responses to increased radiative forcing include enhanced land-ocean contrast, stronger response at higher latitudes than in the tropics, and differential responses in warm and cool season climates to uniform forcing. Here we show that these patterns are also characteristic of CMIP5 model simulations of past climates. The differences in the responses over land as opposed to over the ocean, between high and low latitudes, and between summer and winter are remarkably consistent (proportional and nearly linear) across simulations of both cold and warm climates. Similar patterns also appear in historical observations and paleoclimatic reconstructions, implying that such responses are characteristic features of the climate system and not simple model artifacts, thereby increasing our confidence in the ability of climate models to correctly simulate different climatic states. We also show the possibility that a small set of common mechanisms control these large-scale responses of the climate system across multiple states.