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The flavor of El Niño in a changing climate

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El Niño events, characterized by anomalous warming in the eastern equatorial Pacific Ocean, have global climatic teleconnections and are the most dominant feature of cyclic climate variability on sub-decadal timescales. Understanding changes in the frequency or characteristics of El Niños in a changing climate is therefore of broad scientific and socioeconomic interest. Recent studies show that the canonical El Niño has become less frequent and that a different El Niño "flavor" has become more common during the late twentieth century in which warm sea surface temperature (SST) in the central Pacific is flanked on the east and west by cooler SST. This flavor, termed the central Pacific El Niño (CP-El Niño; also termed the dateline El Niño or El Niño Modoki or Warm pool El Nino), differs from the canonical eastern Pacific El Niño (EP-El Niño) in both the location of maximum SST anomalies and tropical-midlatitude teleconnections. Here we show changes in the ratio of CP-El Niño to EP-El Niño under projected global warming scenarios from the Coupled Model Intercomparison Project phase 3 multi-model dataset.Using calculations based on historical El Niño indices, we find that projections of anthropogenic climate change are associated with an increased frequency of the CP-El Niño compared to the EP-El Niño. When restricted to the six climate models with the best representation of the twentieth century ratio of CP-El Niño to EP-El Niño, the occurrence ratio of CP-El Niño/EP-El Niño is projected to increase as much as five times under global warming. The change is related to a flattening of the thermocline in the equatorial Pacific.