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Projected changes of Precipitation over the far Eastern Tropical Pacific and Western Colombia

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The far Eastern Tropical Pacific and Western Colombia is one of the rainiest places on Earth, and the Choco low-level jet (ChocoJet) is one of the processes that influence the formation of precipitation and convection organization in this region. This study examines projected changes in precipitation using historical and future simulations based on the NCAR Community Climate System Model (CCSM2, 4) and the Community Earth System Model (CESM2), contributing to the Coupled Model Inter-Comparison Project phases 3, 5, and 6 (CMIP3, 5, and 6). We use detailed process-based diagnostic approaches to evaluate the ability of the models in simulating ChocoJet and precipitation relationships at different temporal scales, from daily to interannual. Overall, day-to-day positive disturbances in ChocoJet relate to an increase in intense precipitation events. This relationship is found even in locations far inland in the intermountain valleys of the Colombian Andes. Our results show that relative to CMIP3 and CMIP5 the CMIP6-CESM2 historical simulations show a considerable improvement of precipitation spatio-temporal distribution, with the day-to-day variability and precipitation response resembling more closely that of the observations. In general, late 21st century simulations show a decrease in mean and extreme precipitation consistent the decreased ChocoJet activity. The down trend in ChocoJet activity appears to be connected to a projected increase in frequency and intensity of the warm phase of ENSO.