Opposing changes of ENSO-rainfall teleconnection over the Maritime Continent under global warming

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Year-to-year variations of the Maritime Continent (MC, 80E-160E & 18S-26N) rainfall is strongly influenced by ENSO variability. Seasonal predictability of the MC rainfall heavily relies on climate models’ ability to simulate realistic ENSO developments and its teleconnection. Here we analyze 32 available state-of-the-art CMIP6 models, and find that most models are able to simulate the observed negative ENSO-rainfall teleconnection [i.e., drier than normal during El Niño and wetter than normal during La Niña] over the MC during the boreal winter (DJF, when ENSO normally peaks). Using the sign-adjusted bias analysis for the historical period [1980-2014], we show that CMIP6 models tend to systematically underestimate the negative correlation in the central MC and overestimate the positive correlation in the eastern MC due to the westward intrusion of the positive correlation within the tropical Pacific. In regard to changes in the ENSO-rainfall teleconnection over the MC under global warming, the multi-model mean suggests that, by the end of the 21st century [2065-2099] under the highest emission scenario (SSP585), the negative ENSO-rainfall teleconnection over the western and central MC will strengthen while the positive teleconnection over the eastern MC will weaken. These spatially opposing changes of ENSO teleconnection under global warming could induce dramatic multi-sectoral impacts within the MC.