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Climatological Evaluation of the Mei-yu Front Representation in CMIP6

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Given the significant socioeconomic impact of the East Asian Summer Monsoon (EASM), a critical area of investigation involves comprehending how the EASM and, consequently, the hydrological cycle over East Asia might change in future climates. To address this inquiry, reliable climate models must be employed. While assessments of model performance commonly concentrate on the generated precipitation amounts during the EASM period, it is important to note that the representation of dynamical components such as the Mei-yu front (MYF) are not frequently investigated. As model outputs may be correct for incorrect reasons, the dynamical components of the EASM might be misrepresented.
In this investigation, we scrutinized the representation of the MYF in historical simulations of 38 CMIP6 models from May to August, comparing them to ERA5. Our findings reveal that numerous CMIP6 models encounter difficulties in reproducing the climatology of the MYF similar to observations. By sub-sampling models based on the meridional position bias of the MYF in May, we identified distinct monthly variations within these groupings. Additionally, the origins of these biases were examined. Our study stresses the link between the misrepresentation of MYF climatology in CMIP6 models and the depiction of the North Pacific High, particularly its western edge. The implications of these discoveries are also explored.