The Response of Tropical Climate to Orbital, Ice Sheet, and Greenhouse Gas Forcing
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Substantial changes in tropical climate during the Quaternary Period have been reconstructed from a wide array of paleoclimate proxies. To understand the mechanisms that may be responsible for these changes, we employ a set of single-forcing simulations with a coupled atmosphere-ocean general circulation model and examine the tropical responses to changes in Earth’s orbital parameters (i.e., perihelion date and axial tilt), ice sheet extent, and greenhouse gas concentration. Our analysis focuses specifically on changes in the position of the intertropical convergence zone, monsoon precipitation, the width of the tropics, and the seasonal cycle of temperature. We also examine the implications of these results for the interpretation of paleoclimatic proxies.