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Contribution of the east-west thermal heating contrast to the South Asian Monsoon and consequences for its variability

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This paper investigates the relative role of the north-south and east-west contrast in atmospheric heating for the maintenance of the South Asian summer monsoon climatology. The north-south contrast results from the juxtaposition of the Eurasian land mass and the Indian Ocean, while the east-west one is induced by the warmer western Pacific warm pool on one side and by the African continent and the cooler tropical South Atlantic Ocean on the other. For this purpose a series of idealized Atmospheric General Circulation Model (AGCM) experiments are performed. In the climatology, both contrasts contribute to the mean South Asian monsoon circulation. The precipitation and surface cyclone in the Bay of Bengal and over southern India are affected mainly by the east-west heating contrast, given that the Indian Ocean sea surface temperatures (SSTs) are close to their climatological mean values. The precipitation and surface cyclone further inland over northern India are mainly due to the north-south heating contrast. The east-west heating contrast controls also the strength of the Tropical Easterly Jet. Finally, the contribution of the El Nino Southern Oscillation on the interannual Indian monsoon variability is interpreted as resulting from changes in the east-west heating contrast.