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# The dynamical control of the Tibetan plateau on the East Asian summer monsoon

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The summer monsoon heavy rainfall recurs every year in East Asia through moisture transport by long-lasting southerly low-level winds. The East Asian summer monsoon (EASM) has long been recognized as a response to the elevated heating and mechanical forcing of the Tibetan plateau, and the land–sea zonal heat contrast. However, the relative contribution of individual processes to East Asian summer monsoon generation and the underlying basic dynamics are unsolved. As a predominant mechanism of the EASM, we stress the fluid dynamical effect of the Tibetan plateau, which is related to the forced topographic barotropic Rossby waves based on the potential vorticity conservation theory. The theoretical prediction of the EASM is calculated by a function of zonal wind velocity over the Tibetan plateau. Theoretical derivations of the pressure gradient, meridional wind and precipitation over the EASM area closely follow the observations. In idealized general circulation model (GCM) simulations, the dynamical effect of mountain occupies 65 % of the total East Asian precipitation, whereas the elevated heating affects only 15 %, the drag effect contributes by 5 %, and the land–sea heat contrast accounts for 15 %.