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ITCZ migration in the shallow tropical meridional circulation

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The behavior of the tropical shallow meridional circulation is studied by analyzing the solution to a linear model with a lower well mixed layer (CBL) capped by an uniformly stratified upper layer; the dynamics of the system are forced by diabatically perturbing the geopotential height (GPH) at CBL top; in this model, the GPH perturbation, the CBL depth and the delay times are prescribed.
The main focus of the paper is on the behavior of the intertropical convergence zone (ITCZ).
Results show that, when the diabatic source is compact and the horizontal GPH gradients are large, there is a single convergence zone, which smoothly follows the source in its seasonal migration. While, when the horizontal scale of the source is large and the GPH gradients are weak, a splitting of the convergence zone occurs, and, when the diabatic source is at low latitudes, there is an ITCZ in each Hemisphere, but, as the source moves polewards increasing its distance from the equator, the ITCZ in the winter Hemisphere fades away, while the ITCZ in summer Hemisphere strengthens, remaining the sole convergence zone.
The activity of the equatorial trapped Rossby waves can slow down the ITCZ poleward migration, up to when the distance of the source from the equator exceeds one Rossby radius.
Finally, model results show that the depth of the shallow return flow above the CBL is proportional to the horizontal scale of the source and inversely proportional to the strength of the atmospheric stratification above the CBL.