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Vertical momentum advection enhances the tropical Rossby wave source

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Tropical precipitation and organized convection have a global influence in the form of extratropical teleconnections. The main source for these stationary Rossby wave trains is believed to be vortex stretching by the divergent outflow of convection. We present the tropical zonal-mean momentum budget from reanalysis data and use a Helmholtz decomposition as a diagnostic tool. In contrast to common scaling arguments, vertical advection is an important source of westerly momentum in the tropical upper troposphere, possibly connected to the Madden-Julian Oscillation. The curl of vertical momentum advection, namely vortex tilting and vertical vorticity advection, enhances the tropical Rossby wave source for extratropical teleconnections. The results can inform modeling choices in seasonal prediction and climate models.

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