



## **Potential momentum: a new framework for looking at baroclinic circulations**

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This work introduces the concept of potential momentum, which is a non-local measure of the thermal structure that has momentum units. The use of this concept is advantageous for describing the wave-mean interaction in symmetric quasi-geostrophic flows.

Physically, the potential momentum represents the zonal momentum that the flow would realize through an adiabatic redistribution of mass that made the isentropic thickness poleward of a reference latitude. In the interior, easterly potential momentum is associated with isentropic layers that open up with latitude. At the surface, the poleward temperature gradient represents an easterly reservoir of potential momentum, as implied by the Transformed Eulerian Mean framework.

Redefining the mean flow in terms of the total momentum (which includes the standard momentum and the newly-defined potential momentum), the eddy PV flux appears as the only dynamical forcing for the mean flow. This mean balance thus nicely complements the equivalent conservation relations for the eddies, in the form of eddy pseudomomentum. As a result, the potential momentum framework provides a fully local description of the interaction between the eddies and the mean, eliminating any redistribution effect by remotely-forced meridional circulations.