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# Variability and trends of the meridional energy transports and implications for the Hadley circulation

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The atmosphere and the ocean play a critical role in the Earth energy balance by transporting heat from the equator to the poles. In the atmosphere, this net meridional energy transport is the sum of many atmospheric processes on very different scales in space and time: in the tropics most of the energy is transported poleward by the Hadley circulation, whereas eddies become the principal agency of heat transport in higher latitudes. However these synoptic systems are also believed to interact in a quite complex manner with the Hadley circulation.
The aim of this study is to perform a detailed and updated analysis of the meridional heat transports by the atmosphere and determine the relative role of the Hadley circulation and eddy activity in this energy redistribution. Using 6 hourly ERA-Interim data from 1979 to 2014, we examine the spatial contrasts in the transport of sensible heat, latent heat and potential energy components, and diagnose how these may have been changing on seasonal to inter-annual timescales. These contributions are further partitioned into mean circulations and (stationary and transient) eddies' activities, to explore the complementary variations occurring between baroclinic synoptic systems and mean tropical cells.

Finally, this "unifying conceptual framework" provides new insights into the variability and trends of the Hadley circulation, which help us better understand the factors controlling the behavior of the cell both in the present climate and under a global warming scenario.