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Wavenumber decomposition of midlatitude meridional energy transports and extremes

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We decompose the meridional heat transport in Northern Hemisphere midlatitudes by zonal wavenumber, in order to isolate the role of the mean zonal flow, the planetary and baroclinic waves and higher scale fluctuations. The analysis is conducted on 33 years of 6-hourly ERA-Interim data. Both planetary (zonal wavenumber 1 to 4) and baroclinic (zonal wavenumber 5 to 10) waves exhibit large northward transport extremes, whereas negative extremes are much less pronounced. In agreement with this, the medians and skewness of the distribuions are generally positive at all wavenumbers. We further focus on the poleward and equatorward transport extremes. Both extremes are primarily driven by the k = 0 contribution. In the annual mean, the equatorward extremes actually exhibit a strong positive transport in the baroclinic waves. In DJF, the transports in the planetary wavenumber range for both classes of extremes are much larger than at higher wavenumbers, whereas this is not the case for JJA. The same analysis has been conducted on a regional scale, in order to compare it with results from a high resolution model simulation. We find a good agreement In the range of wavenumbers covered by both datasets.