



## **MTMSVD analysis of the seasonal variation of the QBO signal at low and middle latitudes**

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The MTM-SVD (Multi Taper Method-Singular Value Decomposition) method is used to analyse the seasonal variation of the QBO induced circulation at low and middle latitudes. The QBO spatial pattern in the zonal wind and the patterns of the signal generated in the vertical and meridional wind, temperature, Eliassen Palm (EP) flux and momentum advection are reconstructed for each season and for two different datasets: data from the high vertical resolution configuration of the atmospheric general circulation model MAECHAM5 (M5) and from the ERA40 reanalysis. The datasets cover a 21-year period (1979 -1999) and extend from 100hPa to 0.1hPa for ERA40 and from 100hPa to 0.01 hPa for M5.

At low and middle latitude seasonal asymmetry of the directly induced QBO circulation is evident for both datasets. During solstice, equatorial westerlies and easterlies zones move into the winter hemisphere. This displacement, probably induced by the seasonally dependent Brewer-Dobson circulation, is more evident during the northern winter when these zones extend latitudinally reaching 30° latitude. The patterns obtained for the EP flux divergence and zonal wind advection also present asymmetries about the equator which could also be relevant in the spatial structure of the westerlies/easterlies zones in the winter hemisphere.

It is also evident for both datasets that the secondary meridional circulation associated with the QBO, which presents a two cell structure symmetric about the equator during equinox, turns into one cell structure that extends to 55° latitude in the winter hemisphere and almost disappear from the summer hemisphere. Temperature anomaly is coherent with this one cell structure during the solstice.