Geophysical Research Abstracts
Vol. 14, EGU2012-7809, 2012
EGU General Assembly 2012

Linking jet variability and jet driving processes in the midlatitudes

C. Li (1,2) and J. J. Wettstein (1,3)

(1) Bjerknes Centre for Climate Research, Bergen, Norway (camille@uib.no), (2) Uni Bjerknes Centre, Bergen, Norway , (3) Global Dynamics Division, National Center for Atmospheric Research, Boulder, USA

Two important dynamical processes influence the extratropical zonal wind field: angular momentum transport by the thermally direct Hadley circulation (thermal driving T), and momentum flux convergence by atmospheric waves (eddies) that develop in regions of enhanced baroclinicity (eddy driving E). The relationship between extratropical zonal wind variability and these driving processes is investigated using ERA-40 reanalysis data. Indices representing the processes (iT, iE) are defined based on vertically integrated diabatic heating and meridional convergence of the meridional flux of zonal momentum by eddies, respectively. Zonal wind signatures associated with these indices are identified via composite analysis. In the Atlantic sector, zonal wind variability is mainly associated with momentum flux convergence by baroclinic eddies, supporting the established view that the Atlantic jet is primarily eddy-driven. In the Pacific sector, zonal wind variability is associated with both driving processes, evidence that the Pacific jet is both thermally-driven and eddy-driven. The thermally-driven Pacific signature reflects changes in jet strength (intensity and longitudinal extent) with some resemblance to the zonal wind anomalies of the Pacific-North America (PNA) pattern. The eddy-driven signature reflects a latitudinal shift of the jet exit region in both sectors that resembles the zonal wind anomalies of the North Atlantic Oscillation (NAO) or West Pacific (WP) patterns.