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A climatology based on reanalysis of baroclinic development areas in extratropical Northern Hemisphere

M. Noguerol (1), R. Nieto (1,2), L. de la Torre (1,3) and L. Gimeno (1,2)

(1) Universidad de Vigo, Departamento de Física Aplicada, Facultad de Ciencias de Ourense, Ourense, Spain (mnoguerol@uvigo.es), (2) University of Lisbon, CGUL, IDL, Lisbon, Portugal, (3) University of Aveiro, CESAM, Aveiro, Portugal.

A multidecadal climatology of baroclinic zones in the Northern Hemisphere between 20º to 70ºN was obtained from extremes of vorticity advection, vertical variation of vorticity advection, thickness advection, vertical variation of thickness advection and geopotential at 200 hPa, 500 hPa and 850 hPa as diagnosis parameters. We used both NCEP/NCAR and ERA40 reanalyses for wintertime (December, January, February), from 1958 to 2006 for NCAR/NCEP and from 1958 to 2002 for ERA, on a 2.5ºx2.5º (longitude, latitude) grid. We calculated the diagnosis parameters values in each grid point and put restrictive conditions to these parameters in order to find the preferred areas of baroclinic development. Then we study the times that each grid point fulfils these conditions during the 48 or 44 years respectively. The database of extremes of baroclinic development built in the first part of the study was then used to check if there have been variations in the main areas of occurrence in the last four decades. Same fluctuations were detected. For instance, over Europe, Northeast of Asia and Northeast of America the fluctuations are clearly detected in the occurrence of minima of geopotential at different levels for NCAR/NCEP reanalysis. At 200hPa level pressure minima of geopotential occurs more often during 1968-1977 and 1988-1997, at 500hPa occurs more frequently during 1988-1997 and during 1968-1977 at 850 hPa.