

Changes in lower troposphere over Europe (1951-2000)

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Climate and its variability exert fundamental influence on the natural environment and human life. Since 1979 the near ground temperature trends has been much greater than that aloft (Folland and Karl, 2001). It may be manifested in rising of tropospheric lapse rate and decrease in the static stability of the atmosphere. Global warming together with an increase in the rate of evaporation and a decrease in the static stability must be matched by an acceleration of the hydrological cycle leading to an increase in the frequency of extreme precipitation events (Trenberth, 1999). The decrease in the static stability over Europe may be a reason of strong decrease in frequency of stratiform clouds and an increase in frequency of convective ones observed in central and eastern Europe in the second half of the 20th century (Sun *et al.*, 2001; Wibig, 2004). The main objective of this paper is to analyze the temporal and spatial variability of the static stability in the atmosphere over Europe. The NCEP/NCAR reanalysis gridded daily data of pressure from the ground and geopotential and temperature at selected levels in the troposphere over Europe and the Northern Atlantic from the period 1950-2005 (or later) together with gridded pressure data from the Northern Hemisphere available from CRU were used to analyze the temporal variability of temperature gradients near the ground and in the lower and middle troposphere.

Significant temporal changes in surface pressure distribution occurred in winter months with zonal flow enhancing over Northern Atlantic and Europe in January and February. In December an increase of mean pressure over south-western Europe and a decrease over north-eastern part of continent was established in both datasets. In the level between 1000 and 850 hPa the temperature lapse rate has increased significantly over central and eastern Europe and decreased in the western part of the continent. In higher levels 850/700 and 700/500 hPa significant increases in temperature lapse rates occur also in western part of Europe.

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