Geophysical Research Abstracts, Volume 3, on CD-ROM. 2001

# The importance of synoptic and baroclinic activity over the Atlantic and the Mediterranean for Moroccan precipitation variability

P. Knippertz*, M. Christoph, P. Speth

Institut für Geophysik und Meteorologie, Universität zu Köln, Germany
*knippertz@meteo.uni-koeln.de

ABSTRACT: Monthly and 12 hourly precipitation data from the GHCN (Global Historical Climatology Network), the DWD (German Weather Service) and the NCDC (National Climatic Data Center) for more than 40 stations in Morocco, Western Algeria and Northern Mauritania (0 to 13°W, 25°N to 36°N) is investigated for boreal winter with respect to baroclinicity, storm track activity, cyclone frequency and depth and humidity transports. By means of correlation analysis three regions with relatively homogeneous rainfall characteristics were identified that can be described by a precipitation index, whose extremes build the basis for composite studies. The north-western parts of Morocco show a clear relation between precipitation and the position of the North Atlantic storm track. In months with high amounts of precipitation a southward to south-westward shift of the eastern end of the North Atlantic storm track with a maximum enhancement west of the Iberian Peninsula is found, which is accompanied by more southerly tracks of Atlantic cyclones and an enlarged local cyclone activity north of Morocco and in the Western Mediterranean. Both upper and lower tropospheric baroclinicity is enhanced south of 45°N over the Atlantic and the Mediterranean in these situations, whereas baroclinicity is reduced over the Northern North Atlantic and North-western Europe. The strong westerly winds, that are associated with cyclones close to the Iberian Peninsula and their accompanying fronts lead to a strongly enhanced moisture transport from the Atlantic into Morocco in the lower troposphere. Consequently, precipitation in North-western Morocco occurs mainly on days when westerly or north-westerly circulation weather types (after Lamb) are present. Precipitation in North-eastern Morocco and North-western Algeria and in the region south of the Atlas mountains, however, appear to be somewhat more independent of the Atlantic storm track activity and stronger related to local cyclone or convective activity. Nevertheless, a strong moisture transport from the Atlantic along the southern flank of the Atlas mountains associated with cyclones west of Morocco and the Iberian Peninsula can be identified as a decisive factor for precipitation in the latter region. Besides, the orographic lifting through the Atlas mountains during southerly and easterly weather situations seems to be triggering convection or enhancing large-scale precipitation. In contrast to that, North-eastern Morocco and North-western Algeria is dominated by the influence of cyclones over the Western Mediterranean that are associated with locally enhanced storm track activity and a strong north-westerly moisture transport into this area. The study is part of the interdisciplinary IMPETUS (an integrated approach to the efficient management of scarce water resources in West Africa) project, whose general outline is the investigation of different aspects of the hydrological cycle of the Ouémé catchment in Benin and the Drâa catchment in Morocco.