

20TH-CENTURY CHANGES OF TEMPERATURE IN THE MOUNTAIN REGIONS OF CENTRAL EUROPE

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Abstract. Daily maximum and minimum temperatures from 29 low-lying and mountain stations of 7 countries in Central Europe were analyzed. The analysis of the annual variation of diurnal temperature range helps to distinguish unique climatic characteristics of high and low altitude stations. A comparison of the time series of extreme daily temperatures as well as mean temperature shows a good agreement between the low-lying stations and the mountain stations. Many of the pronounced warm and cold periods are present in all time series and are therefore representative for the whole region. A linear trend analysis of the station data for the period 1901–1990 (19 stations) and 1951–1990 (all 29 stations) shows spatial patterns of similar changes in maximum and minimum daily temperatures and diurnal temperature range. Mountain stations show only small changes of the diurnal temperature range over the 1901–1990 period, whereas the low-lying stations in the western part of the Alps show a significant decrease of diurnal temperature range, caused by strong increase of the minimum temperature. For the shorter period 1951–1990, the diurnal temperature range decreases at the western low-lying stations, mainly in spring, whereas it remains roughly constant at the mountain stations. The decrease of diurnal temperature range is stronger in the western part than in the eastern part of the Alps.

1. Introduction

Many climatologists (IPCC, 1990, 1992) agree on a large-scale warming of Earth's surface over the last hundred years. The observed warming is, however, not uniform on the globe, it has a pronounced seasonal dependence, and it shows also a diurnal asymmetry. In a series of publications, Karl et al. (1984, 1991, 1993) have presented evidence that in the last decades the daily minimum temperature has increased in relation to the daily maximum temperature. This asymmetric evolution of daily extreme temperatures caused a decrease in the diurnal temperature range (DTR), defined as the difference of daily maximum and daily minimum temperature. Equilibrium general circulation model experiments (Cao et al., 1992) for a climate under doubled CO₂ concentration also yield a general decrease of DTR, however, with a smaller amplitude compared to the increase of the mean