Urban climate and tourism potential in Freiburg, Germany

Andreas Matzarakis[1)], Christina Endler[1)]

1) Meteorological Institute, Albert-Ludwigs-University of Freiburg, Werthmannstr. 10, 79085 Freiburg, Germany, andreas.matzarakis@meteo.uni-freiburg.de

Climate and tourism are strong correlated. Urban areas have a relevance concerning not only to cultural tourism but also for recreation. The high discussed topic of global change is focused in the tourism climatology as well. In the last century, global warming refers to an air temperature increase of 0.74 °C on average. The IPCC Fourth Assessment Report (AR4) declares a possible span of global temperature increase of about 1.1 °C in the best case (B1) and 6.4 °C in the worst case (A1FI) by the end of the 21st century. The southwest of Germany is more affected by a rising air temperature expecting an increase of about 3.5 °C. Therefore, we analysed exemplarily the climate potential and its variation of Freiburg. Freiburg states an interesting study site for climate and tourism research being located at the foothills of the Black Forest. Additionally, Freiburg is one of the most important and visited cities in the Black Forest.

In our study, the modeled data based on the A1B and B1 scenarios is carried out by the regional climate model REMO from the Max-Planck-Institute of Meteorology in Hamburg. The data has a high spatial and temporal resolution and is available from 1950 until 2100. In that way, the period 1961-1990 of the A1B scenario, respectively, is used as the reference period for future climate change. Additionally, data from the station of the German Meteorological Service (Deutscher Wetterdienst) for the period 1961-2000 has been used as well.

The used model data builds the base for thermal, physical, and aesthetic computations being used for the validation of both thermal comfort and tourism and recreation potential. The thermal component is expressed by the Physiologically Equivalent Temperature. Based on thresholds factors like thermal comfort, heat stress, cold stress, sultriness, fog, sunshine duration, dry days, rainy days and days with snow are analysed. Moreover, frequency classes and frequencies of extreme weather events are generated based on a monthly interval. The derived results are prepared and analyzed in terms of climate tourism information schemata (CTIS).

The analysis based on the A1B simulation shows a strong increase in heat and thermal stress as well as in humid warm conditions. Cold stress, thermal acceptability, and ski potential are clearly reduced by the end of the 21st century. In general, the results of B1 are lower compared to A1B.