



Climate change scenarios in use: Heat stress in Switzerland

Ana Casanueva, Sven Kotlarski, Andreas M. Fischer, Cornelia Schwierz, and Mark A. Liniger

Federal Office of Meteorology and Climatology, MeteoSwiss, Zurich Airport, Switzerland (ana.casanueva@meteoswiss.ch)

Global mean temperature is projected to increase until the end of the 21st century under all emission scenarios. Likewise, temperature extremes such as the highest daily temperature, the number of tropical nights or heat wave intensity and duration are projected to increase. These changes will ultimately affect biodiversity and human beings. Under hot conditions the human body is able to regulate its core temperature via sweat evaporation, but this ability is reduced when air humidity is high. These conditions of high temperature and humidity invoke heat stress which is a major problem for vulnerable groups of the population and people exposed to such situations (e.g. working outside or without appropriate cooling systems). In this context, climate services play a crucial role by bridging the gap between meteorological information and sustainable solutions to mitigate future heat stress.

In the present work we explore the CH2018 Swiss climate scenarios (www.climate-scenarios.ch) in order to present 1) climate change projections of heat stress considering different sources of uncertainty and 2) applications of such climate projections in the framework of climate services. Heat stress is expressed through the Wet Bulb Temperature (WBT), which is a relatively simple proxy for heat stress on the human body and which depends non-linearly on temperature and humidity. A large ensemble of state-of-the-art RCM simulations from the EURO-CORDEX initiative is used to produce climate change projections of the WBT. Since raw RCM data cannot be directly used in impact studies due to their coarse resolution and their partly substantial biases, a standard bias correction method (empirical quantile mapping) is applied to correct the individual variables that are used to derive the heat stress index.

Climate change projections indicate increasing heat stress over Switzerland, which is accentuated towards the end of the century. High heat stress conditions might be about 3-5 times more frequent for the strong RCP8.5 emission scenario than for the RCP2.6 mitigation scenario by the end of the 21st century. An example of application of the scenarios in the frame of climate services consists of the analysis of consecutive days with WBT above a specific threshold as a proxy for the currently defined heat warnings. The projected increase of heat stress results in more heat warnings, thus highlighting the importance of timely and precise prevention strategies in the context of heat-health action plans.