Geophysical Research Abstracts
Vol. 21, EGU2019-6092, 2019
EGU General Assembly 2019

Heat stress indices in Switzerland: examining heat warnings

Annkatrin Burgstall, Ana Casanueva, Sven Kotlarski, Regula Gehrig, and Cornelia Schwierz
Federal Office of Meteorology and Climatology MeteoSwiss, Zurich-Airport, Switzerland

High temperatures can lead to heat-related human stress and discomfort. Heat stress indices combine different meteorological variables such as temperature, relative humidity, radiation and wind speed. In this contribution, a set of widely-used heat stress indices is considered to examine the risk of heat stress. A comparison with the Heat Index (currently used to issue official heat warnings in Switzerland) is performed, considering 28 Swiss weather stations for the years 1981-2017. More precisely, it is investigated how well warnings that are based on the Heat Index match warning days and warning periods that are calculated from other heat stress indices. To identify these warnings, individual thresholds for each index and for each station are derived by using a frequency-based approach, meaning that the number of warning days (issued with the Heat Index) stays the same regardless of the index used.

The percentage of warnings that match the official warning varies among indices. It ranges from 53.8% (Wet Bulb Temperature) up to 95.5% (Simplified Wet Bulb Globe Temperature). The different sensitivity of the indices to the input parameters plays a major role for the resulting heat warnings and might be the reason for the differing matches among the analyzed indices. Considering the Heat Index as reference, the well-performing Simplified Wet Bulb Globe Temperature has some further advantages such as no lower bound and allowing for the calculation of climatological values. Yet, other indices (e.g. with higher dependencies on humidity) can have some added value, too. Thus, regardless of the performance in terms of matches, the optimal index to use strongly depends on the purpose of the warning.