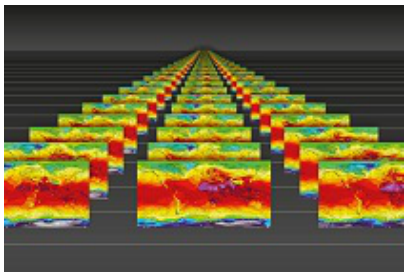

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Predicting heat stress: using S2S models for a heat warning system

Hot temperatures and prolonged periods with large thermal discomfort can have tremendous socio-economic impacts. Besides temperature alone combined indices are frequently used as heat stress proxies as they better quantify the physiological impact of heat. They are primarily based on a combination of temperature and humidity, but can also include additional variables such as radiation and wind. Predicting such heat stress proxies as early in advance as possible could be of great value as a basis of preventive measures against the impacts of heat waves.

In this contribution we use the wet bulb globe temperature (WBGT), a combination of temperature and humidity (expressed as dew point temperature), as an indicator for heat stress. We post-process daily maximum temperature and average dew point temperature of the IFS-ENS-EXT-hindcasts for a large set of European locations using an empirical implementation of quantile-mapping and ensemble model output statistics.

Overall these WBGT forecasts provide added value over a climatological reference forecast up to lead times of 15-20 days. We show that forecast skill of WBGT is equal or better than that of the underlying variables (air temperature and dew point temperature). Also the skill spatial pattern of WBGT seems to combine the skill pattern of temperature and humidity into an overall picture of increased skill. We argue that biases and deficiencies in the underlying variables compensate each other in the combined index WBGT. Especially during summer, temperature and humidity are highly coupled variables and consequently errors in humidity forecasts tend to be anti-correlated to temperature errors. For the index this means that strong dry-biases in humidity will be compensated by strong warm-biases in temperature, but in combination they lead to an overall good estimate of WBGT.

Primary authors: RAJCZAK, Jan (MeteoSwiss); Dr SPIRIG, Christoph (Federal Office of Meteorology and Climatology MeteoSwiss, Zurich, Switzerland); BHEND, Jonas (MeteoSwiss); CASANUEVA, Ana; KOTLARSKI, Sven; Dr LINIGER, Mark (Federal Office of Meteorology and Climatology MeteoSwiss, Zurich, Switzerland)

Presenter: RAJCZAK, Jan (MeteoSwiss)

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