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Pace of change of heat stress and temperature extremes

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Temperatures are expected to increase during the twenty-first century as global mean climate is warming. Here we study associated consequences of this increase on extremes of temperature and on extremes of a heat stress indicator of both humidity and temperature named Wet-Bulb Global Temperature (WBGT). We focus on the pace of change of these extremes with a continually moving baseline (i.e. as a difference between two successive 20-year periods), as it is more related to changes felt by the population. We here analyse daily projections of CMIP5 models for historical and RCP8.5 scenario.

We show that WBGT extremes increase in the future climate projections as well as extremes of temperature, as expected and shown in previous papers. We show that the global speed of change of WBGT with a moving baseline is doubled between 1980-2000 and 2080-2100 in the models, and can be multiplied by up to 4 in some regions (e.g. Amazonian region). This global speed reaches at least +1.2 unit of WBGT per 20 years in the late twenty-first century, which corresponds to a change of one danger threshold (defined in health papers) in 20 years for regions already impacted by a strong heat stress. However, we show that air-surface relative humidity decreases over land during the twenty-first century in the models. This decrease of relative humidity tends to hamper the speed of increase of the heat stress extremes compared to temperature.