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Future projections of climate indices support adaptation policies in Switzerland

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Climate change impact assessments, adaptation strategies and mitigation policies depend on the provision of localized climate change information in sector-relevant quantities. Here, a framework is presented to translate climate scenarios of seasonal means into scenarios of impact-oriented daily climate indices. The scenarios are taken from the Swiss climate scenario initiative "CH2011". The indices chosen are of direct relevance in sectors such as tourism, transportation, agriculture, ecosystem management and health. They include key climate indices such as the number of summer days and tropical nights, growing season length, number of frost days, heating and cooling degree days, and the number of days with snowfall. The framework developed provides results on a high spatial and temporal resolution.
The projections show a doubling of the number of summer days under the emission scenario A2 in the Swiss Plateau ($\approx$ 500 m asl) for the period 2070-2099 with respect to 1980-2009. Tropical nights may appear at altitudes as far up as 1500 m asl, whereas in today's climate these are almost inexistent in Switzerland. The number of frost days is expected to be substantially reduced in Switzerland. At altitudes above 2500 m asl, this reduction amounts to more than 90 days. Furthermore, an overall decline of heating degree days of about 30% is projected by the end of the century, and the number of days with snowfall tends towards zero at low altitudes. The results also reveal that future projections for all indices strongly depend on the chosen emission scenario, on internal variability and on model uncertainty. Therefore, it is essential to communicate the role of uncertainties and inherent assumptions in climate projections.
We will show that climate indices can facilitate the communication of climate change to stakeholders and decision makers. Examples of how this information is used in sectors will be provided.