



CLIM-RUN



Thermal component of climate potential for tourism in Croatia

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Target Groups

- **Tourism institutions**
- **Tourism stakeholders**

Relevance to the Case-Study Requirements

As a natural resource for tourism climate determines the attractiveness of a region and therefore it has a limiting function on the “tourism potential”. For Croatia, benefiting primarily from beach tourism, the climate-related change in the thermal component of climate potential is likely to become increasingly important. Adaptation to climate change is important not only for tourists but also for many other actors involved in tourism sector.

The Approach

The balance between human body and the thermal environment is complex and depends on air temperature, wind, humidity, solar and terrestrial radiation, as well as on gender, metabolism and clothing. The thermal impact on humans is determined by a biometeorological index: physiologically equivalent temperature (PET) which is derived from the equation of thermal balance between the human body and the environment and by taking into account all the components of this relationship (Höppe, 1999). PET is defined as the equivalent temperature at which a person being indoors would feel as if in real outdoor conditions. The advantage of this index is that it uses a widely known unit (degree C) thus making the interpretation of the results easier. Besides, it also includes a thermal sensation scale ranging from “very cold” to “very hot” (Matzarakis, Mayer, 1996).

The PET index has been calculated for the two future climate periods as well as the present day (1961-1990). The mean values for the PET input data were obtained from two arbitrarily chosen runs of the RegCM3 regional climate model which was forced by the ECHAM5-MPIOM GCM under the IPCC SRES A2 emission scenario. The RegCM3 horizontal resolution was 35 km. The PET was computed for 2 p.m. local time assuming that this is the time when most of the tourists are outdoors and therefore most exposed to atmospheric conditions.

The quantification of the changes in the climate tourism potential was made by applying the changes in the number of days with the heat stress and the frequency of occurrence of the different thermal sensations, both of which (heat stress and thermal sensations) are determined by PET.

It has to be emphasised that there are uncertainties as well as limitations in simulating future climate (IPCC 2007). For example, the application of more than one emission scenario as well as simulations from more climate models are recommended (Amelung and Viner 2007; IPCC 2007; Matzarakis and Amelung 2008). A single model approach, as in our study, does not allow a full estimate of uncertainties and therefore would have some limitations. Another limitation is the model 35 km spatial resolution, which may be regarded as too coarse for complex orography at the Adriatic coast (Brankovic et al. 2012). However, the methodology and the approach described here demonstrate the potential of the PET and the usefulness of its application for the benefit of the tourism sector.

References

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The Product Example

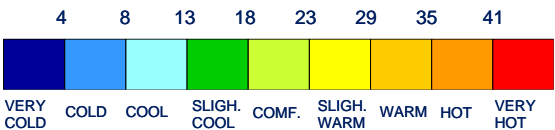
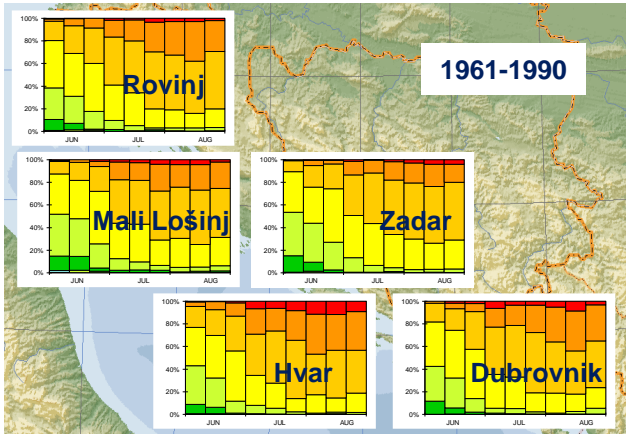


Fig. 1. Distribution of thermal perception (PET) for JJA at 2 p.m. (observed station data for the period 1961-1990).

In the northern Adriatic an increase from slightly warm to the hot thermal perception could be expected.
In the southern Adriatic there would be even a decrease in the occurrence of the warm thermal perception, but an increase in the hot and very hot thermal perceptions.

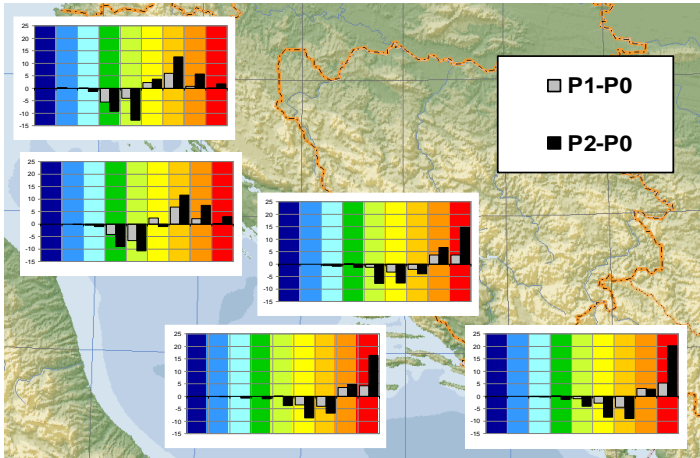


Fig. 2. Differences in relative frequencies of thermal perception between 1961-1990 (P0), 2011-2040 (P1) and 2041-2070 (P2), 12UTC (1 p.m.)

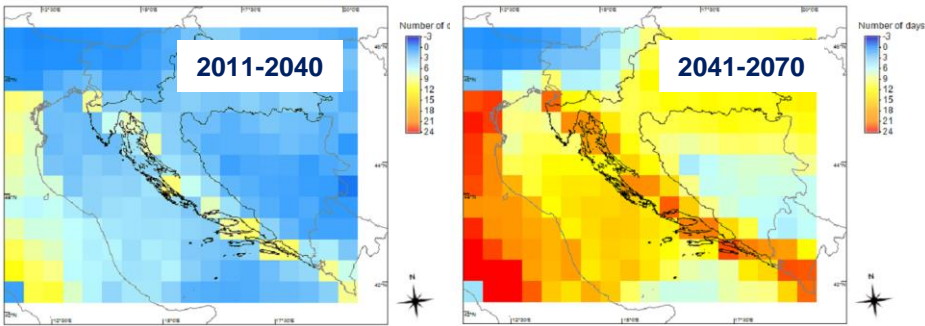


Fig. 3. Changes in number of days with heat stress (PET>35°C)

In the period 2011-2040 heat stress might be expected more frequently than in the reference climate along the coast, but in fewer days over some islands in the north and in the southern part. In 2041-2070, the increase in number of days with heat stress would be even more pronounced.

Making the Product Usable

The results already point to hot conditions during afternoons along the Croatian Adriatic coast. In the future, this trend is projected to increase, indicating that the tourism sector in Croatia would need to adapt and make new strategies, especially for the southern Adriatic.

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