

# A quantile-quantile approach for the adjustment of climate potential for tourism at local and regional scales: Application to the Mediterranean coastal region

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Beach-based holidays are one of the primary socioeconomic activities in the whole Mediterranean coastal basin and are very closely linked to its climate. The socio-economic and environmental adaptation that this region must make in the mid- and long-term has to take into account the changes in the tourist potential when the climate changes. A second generation climate index for tourism (CIT) has been adopted to measure tourism potential under the present and possible future climatic conditions. The CIT is a theoretically based and empirically derived index that allows assessing the sun, sea and sand (3S) weather resource.

Daily observed series of temperature, precipitation, relative humidity, cloud cover and wind speed have been obtained from the ECMWF centre and have been used to derive the present climate potential for tourism. For future projections, daily-averaged meteorological variables have been obtained from a set of regional climate models (RCMs) within the European ENSEMBLES project. The adoption of a multimodel ensemble strategy allows quantifying the uncertainties arising from model errors and boundary conditions.

To use CIT values based on RCM data properly at regional and local scales, a quantile-quantile adjustment has been applied. The method consists of detecting changes in the cumulative distribution functions between a control period and successive future time-slices of the simulated CIT and applies changes, once they have been calibrated, to the control observed CIT series.

Then, we expect to explore the possible changes in the frequencies of days with unacceptable, acceptable and ideal perceptions for carrying out 3S outdoors activities. As an example, climate change could result in an important impact for the current seasonally adjusted tourist sector for many Mediterranean countries. We also expect to generate useful information for policymakers and teams of experts planning socioeconomic and environmental future of the region and, therefore, they could respond more effectively to the demanding challenge of regional and local adaptation to climate change by implementing adaptation and mitigation strategies to the tourist sector.