CLIM-RUN Product Information Sheet: April 2014

Sea Surface Temperature in Coastal Regions

Clotilde Dubois[1] Adeline Cauchy[2],
[1] Centre National de Recherches Météorologiques - Météo France (CNRM), Toulouse, France
[2]TEC Conseil, Marseille, France

Key words : Climate projections, Mid-century, Tourism, Coasts, Mediterranean, SST

Target groups

- **Tourism institutions**
- **Coastal tourism operators**
- **Tourists**

Relevance to the Case-Study Requirements

Under climate change, bathing conditions are expected to change and these changes may have large impacts on coastal activities. Such impacts can be positive if we look at the opportunity to extend the bathing season as well as negative, taking into consideration the possible proliferation of jellyfish for example.
Consequently, tourism stakeholders expressed the need for climate information about the possible change of sea surface temperature in the surrounding sea.

The Approach

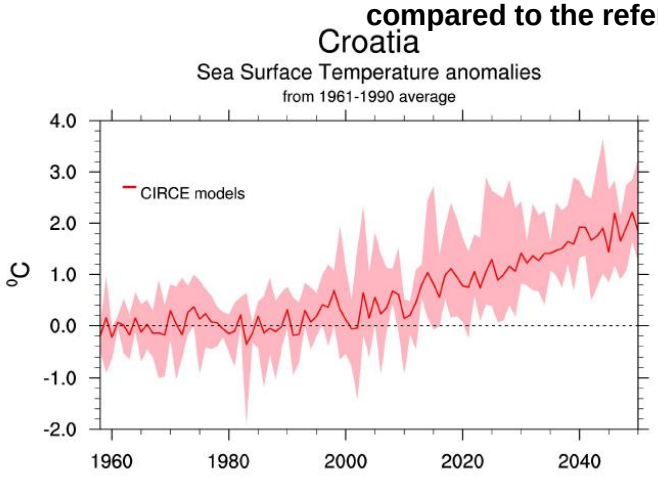
A high-spatial resolution of the Mediterranean sea is required to represent the local and complex bathymetry of the Mediterranean coast. A number of such simulations were carried out within the EU FP6 CIRCE project. These simulations illustrate the possible climate change for the period 1950 to 2050 following the A1B greenhouse gas emissions scenarios with respect to the reference period of 1961-1990. The simulations were carried out by five different institutes: ENEA, MPI, INGV, LMD and CNRM using high-resolution coupled atmosphere-ocean regional climate models (AORCMs). They have a 10 km horizontal resolution in the ocean. Here, we present the change in sea surface temperature (SST) over the period 1950-2050 for four coastal areas: Croatia, Cyprus, North Adriatic and Gulf of Gabes. The four different locations are defined as an area around each coast line. For Croatia, the area is defined between: 5.8-7°E and 45.2-46.5°N; for Cyprus, the area is defined between: 32.1-35.1°E and 34.2-35.5°N; for the Gulf of Gabes (Tunisia), between: 10-11.5°E and 33.3-34.6°N: and, for Venice (North Adriatic), between: 12.3-14.5°E and 44.2-45.5°N.

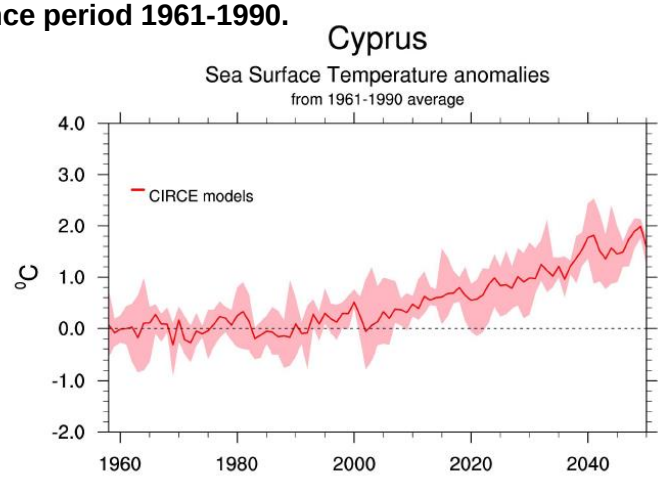
The Product

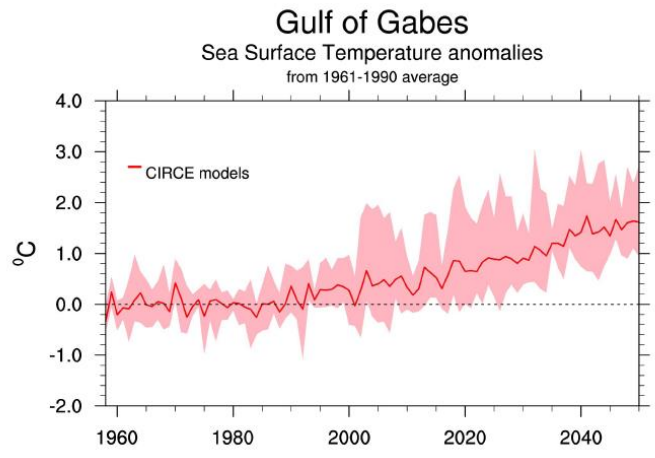
At all the different locations of interest the projections of the yearly SST up to the middle of the 21st century are compared with the reference period 1961-1990. SSTs are projected to increase in the future in all areas of interest. The pink shaded envelope shows the warming simulated by the five different models. The red line is the ensemble mean of the five models. By the middle of the century, the increase is on average between 1.8 to 2°C. Warming is stronger in the Venice (North Adriatic) and Croatian regions. The results obtained represent projections for the open sea at the different locations. The model resolution and the physical processes simulated mean that the model outputs cannot be compared easily with observations of SST or bathing water temperature for a particular beach. Many other processes are involved very close to the beach.

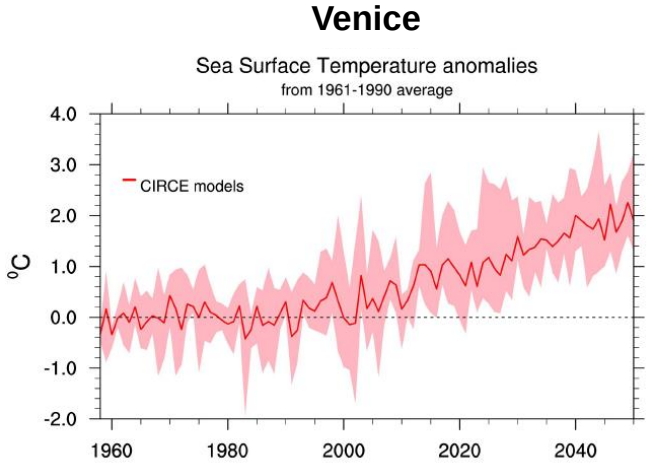
Sea Surface Temperature in Coastal Regions

Projections of the yearly SST at four different locations up to the middle of the 21st century compared to the reference period 1961-1990.









Making the Product Usable

We are aware that the product delivered here may underestimate uncertainty due to the use of only five models and one emission scenario. In addition, these simulations were the first realized with AORCMs over the Mediterranean sea. However, we think that the new generation of high-resolution AORCMs will give more reliable results for the projection of SST in the complex bathymetry of the Mediterranean sea. In the near future, new simulations coming from the MED-CORDEX project will be used. More climate models are carrying out high-resolution climate simulations over the 21st century under different emissions scenarios. These new simulations will provide larger ensembles and hence a better representation of uncertainties for future climate change. In the future, observed time series could be collected or retrieved for specific coastal sites and used to apply a statistical correction to the simulations. This could also help us to calculate a bathing index.

For stakeholders, this product indicates the effects of climate change on SST at different locations. It could be coupled to a detailed analysis of the impacts on water quality in order to assess future opportunities and threats for bathing activities.

Contacts :
Clotilde Dubois – Clotilde.dubois@meteo.fr
Adeline Cauchy – Adeline.cauchy@tec-conseil.com

Further information :www.climrun.eu

This information sheet was developed in the framework of the CLIM-RUN FP7 EU project. The product it describes should not be used without acknowledging the project and, particularly for any operational use, interaction with the authors is welcome and strongly encouraged.