

# Explore the potential of seasonal climate predictions: A challenging opportunity and a competitive advantage for your business

**Predictia** has great experience in the field of seasonal forecasting, being actively involved in different EU projects contributing to the development of climate services in Europe.

These services are offered in partnership with one of the leading research groups in this field (Instituto de Física de Cantabria; mixed research institute from the Spanish National Research Council and the University of Cantabria), which participates in the training and scientific consulting activities, thus ensuring to keep the services up-to-date and allowing to quickly incorporate new research advances.

## What is behind seasonal climate predictions?

Weather and climate forecasts are produced using global climate models.

However, in contrast with the popular weather forecasts (e.g. maximum temperature will be 15.5 °C in Madrid tomorrow), seasonal predictions provide information on how seasonal average weather is likely to be a few months in advance (e.g. there is a 80% chance that the next season will be hotter than usual in central Spain).

Despite its potential value for many sectors, they are currently underexploited due to **several limitations**:

- 1) Seasonal forecasts are by nature **probabilistic**. There is a difficulty to correctly interpret this kind of information and to properly incorporate probabilistic forecast products into business decision-making processes.
- 2) The performance of state-of-the-art seasonal forecasting systems is poor outside the tropics (see Figure 1) **and skill varies according to the variable, region and season of interest**. As a result, a robust tailored assessment of these products (based on past performance) is needed to explore their potential for each particular application.
- 3) The current **spatial resolution** of these products (50-100 km) is not sufficient for most practical applications. Thus, proper statistical calibration or downscaling methods are needed to go from global to local, obtaining suitable local predictions (see Figure 2).

Get ready for the new era of **climate services** (from weather forecast to climate prediction)



**predictia@predictia.es**  
**www.predictia.es**  
Avda. los Castros s/n.  
Edificio I+D+i. S345  
CP 39005, Santander, Spain  
+34 942 76 44 10

**Whatever your business may need, don't hesitate to contact us!**

# What do we do?

In order to cope with these limitations, we provide the following services for capacity building and tailored evaluation of seasonal predictions for your business, saving time and money:

## 1. Capacity building and consultancy:

We offer courses (and consultancy services) from one day to one week adapted to your needs, describing the scientific basis and the state-of-the-art of seasonal forecasting, and allowing you to correctly interpret the existing products and their associated uncertainty.

## 2. Tailored evaluation of seasonal forecast skill:

We provide proper evaluation of forecast skill for targeted areas and variables/indices, considering the retrospective predictions of the top global climate models for the last two-three decades and appropriate statistical validation scores which account for different aspects of a forecast.

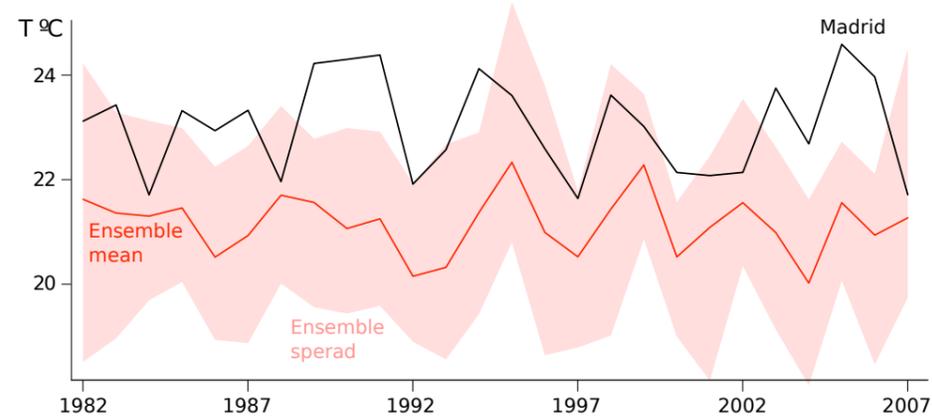
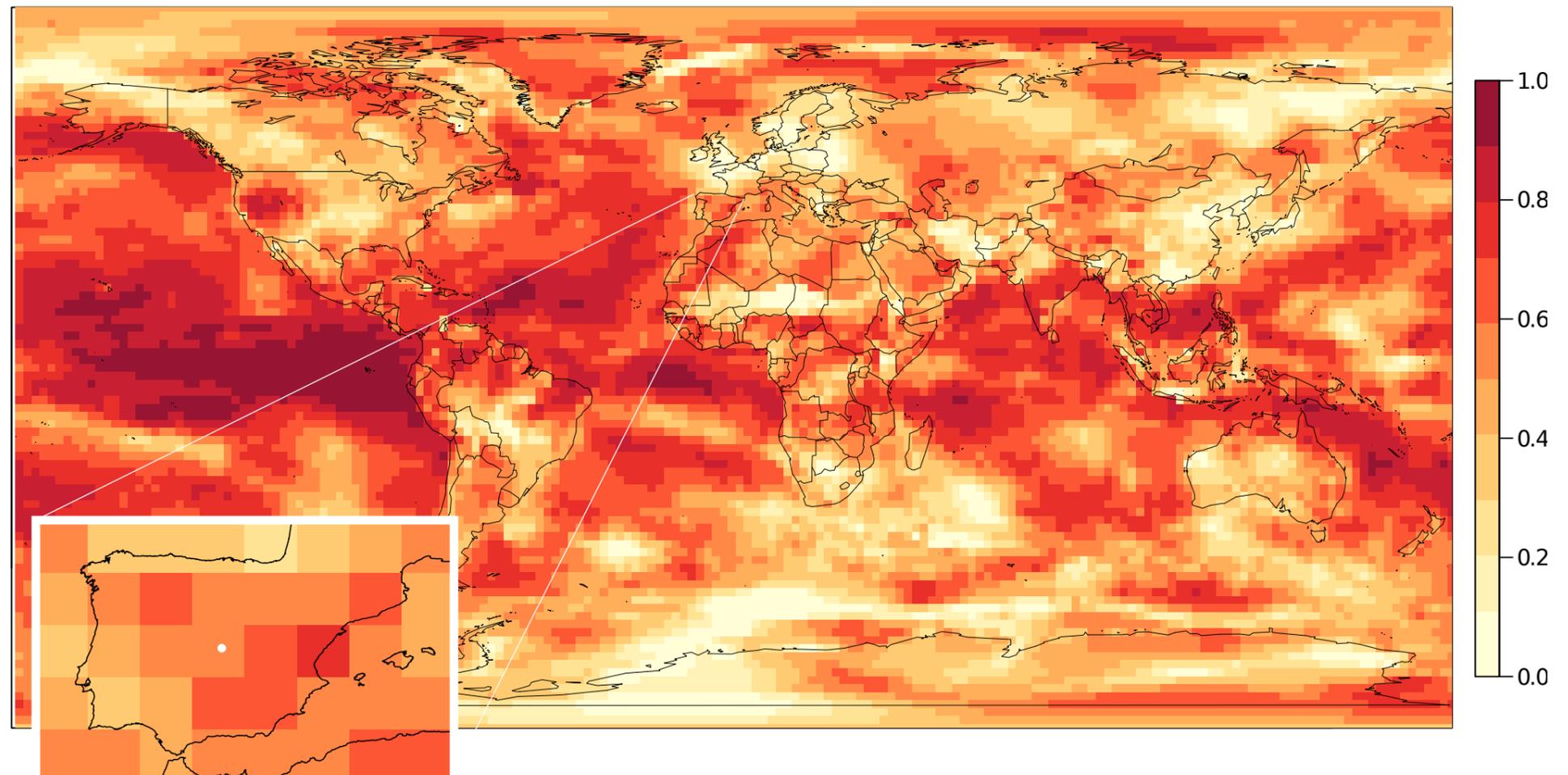
## 3. Local calibration and adaptation:

We are specialists in applying statistical techniques which properly adapt the coarse-resolution global seasonal forecasts to your locations of interest.

## 4. Operational tailored predictions:

We provide operational predictions for your business based on the best performing global models and calibration tools resulting from 2-3, in the manner and format most suitable for your business.

**Tailored solutions for different sectors, providing a portfolio of products, which can be delivered in the manner and format more suitable to your needs (reports, maps, tables, user-oriented indices, etc.). Moreover, the products are continuously updated in the light of new scientific results.**



Seasonal forecasts are operationally produced using global climate models, which simulate the state of the ocean and atmosphere for the coming months (e.g. next season). In order to account for the uncertainty, different realizations (members) are produced from slightly different initial conditions and/or model perturbations. The resulting ensemble (see, e.g. the red shade in the figure above) allows estimating the likelihood of different events/indices related to the seasonal average weather. Moreover, these predictions exhibit systematic biases and do not represent local features, so several applications require advanced postprocessing.

**Figure 1 (top):** Interannual correlation between observed and predicted (one month in advance) June-July-August mean temperature for the period 1982-2007. The proper validation of these probabilistic forecasts requires the use of a number of complementary scores to analyze different aspects of the prediction (accuracy, reliability, etc.) and the availability of a long retrospective forecast (over 30 years).

**Figure 2 (bottom):** Observed (black) and predicted (red) series of June-July-August mean temperatures in Madrid (white point in the above inset). The red solid line represents the ensemble mean and the shade the ensemble spread (minimum-maximum). As a result of the low spatial resolution of current global climate models, the prediction exhibits a systematic biases (note that the predicted temperature is  $\sim 2^\circ$  smaller in average). Different techniques (bias-correction and/or downscaling) have been developed to deal with this problem; however, the optimal solution is application dependent, so tailored solutions based on the latest research are required.