AgroClima and DataClima
A simple and interactive way to access Drought indicators in Portugal

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Public and scientific interest in climate change has increased significantly in the last decade, driven not only by greater societal awareness of climate change but also by the growing frequency of extreme weather events. In this context, IPMA, as the national authority on climate matters, reinforces its role as a reference entity in the monitoring, analysis, and communication of climate variability and climate change. To this end, IPMA has developed two complementary platforms that integrate innovative climate modeling methodologies with in situ observational data. Together, these platforms constitute essential tools for civil society, providing reliable, high-quality, and easily accessible information. They support continuous climate monitoring and facilitate climate change adaptation, strengthening planning and decision-making processes across multiple socioeconomic sectors.

Key objectives

- Strengthen national climate monitoring capacity
- Collaborate with national administrations to support adaptation in priority sectors
- Facilitate the development of data and tools to generate climate information adapted to society
- Provide a platform for national stakeholders to share good practices and knowledge across Europe

Main objectives of DataClima

- Make available modeled climate indicators for mainland and island Portugal, from 1981 to the present
- Produce climate indicator statistics for different territorial units
- Improve the spatial resolution of the data using downscaling methods
- Offer an interactive experience that is easily accessible to the user.
- Provide climatological normals, as well as monthly data from various weather stations since 1941

Data source

Climate Change Service
ECMWF

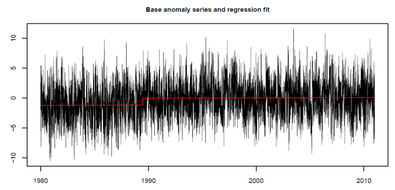
The data comes from the ERA5 climate reanalysis by the European Centre for Meteorological Forecasts (ECMWF), available through the Copernicus service.

Data source

AWS Network
IPMA (DivCA)

Monthly data available from 1941 to the present for several weather stations.

The processing of climatological data in situ was performed on observational data series. In the validation of in situ observation data, periods without data records were identified. The missing daily values were supplemented with data from model. This data comes from the ERA5 reanalysis of the ECMWF, and is available through the Copernicus Climate Change Service (C3S). The methodology used to generate the modeled climatology for the National Territory is based on the implementation of the dynamic downscaling process, using the WRF (Weather Research and Forecasting Model) version 4.2 numerical weather forecasting model (Skamarocket et al. 2008).
I was also used the RClimDex software package for data homogenization. The series were homogenized without filling the gaps with the model and subsequently with the model data. In this step, the identified breakpoints were validated or rejected. It was found that in most data series, the model data input did not cause significant variations in their homogenization. Therefore, the gaps were filled with the model data and then homogenization was performed again.



Two platforms

AgroClima
Interactive digital platform with access to meteorological and agroclimate indicators, that provide agroclimate warnings based on established thresholds.

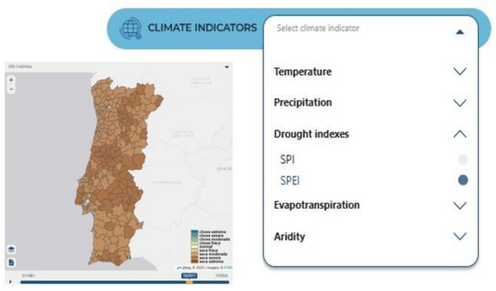
DataClima
Interactive digital platform that provides access to climate indicators for mainland and island Portugal, based on model data and observational data.

The DataClima platform is promoted within the framework of the National Collaborative Programme (NCP) of the Copernicus Climate Change Service (C3S) / ECMWF.

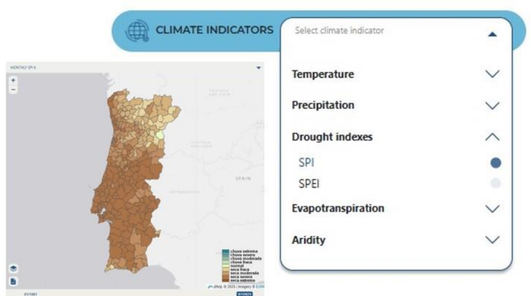
DataClima Platform

Drought Indicators

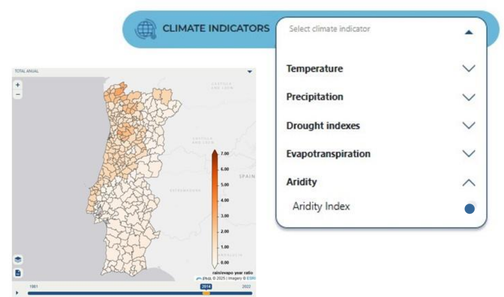
- **SPI** (Standardized Precipitation Index)
- **SPEI** (Standardized Precipitation-Evapotranspiration Index)
- **Aridity Index**



SPEI (3 months) in mainland Portugal, in October 2017. Aggregation by municipalities.

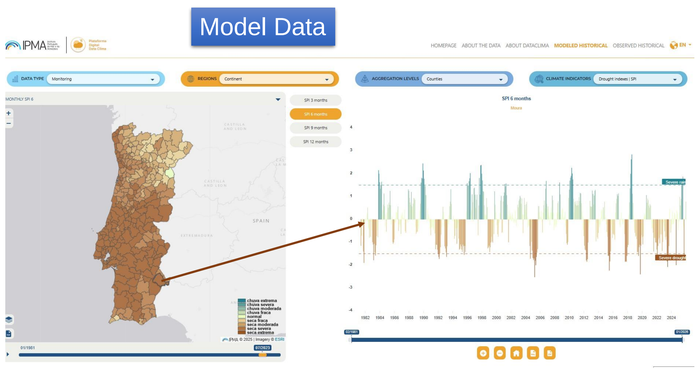


SPI (6 months) in mainland Portugal, in July 2023. Aggregation by municipalities.

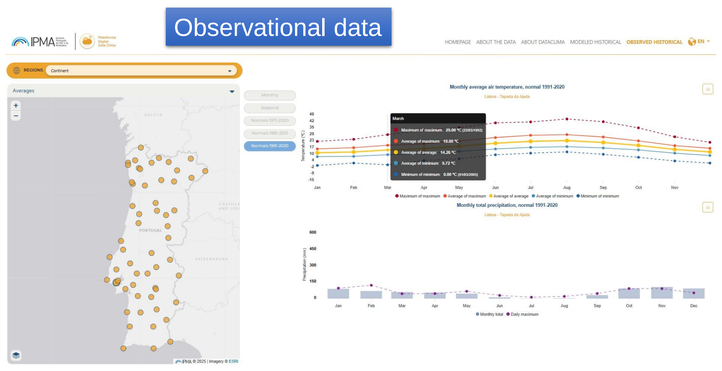


Aridity index in mainland Portugal for the year 2014. Aggregation by municipalities

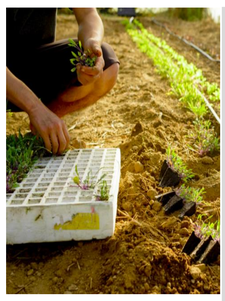
Model Data



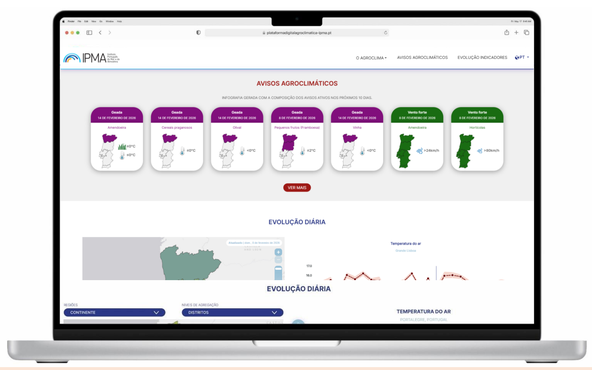
Observational data



AgroClimate Platform



Currently, the agricultural sector faces the challenge of increasing productivity sustainably, adapting to climate change, and incorporating new technologies and climate data to support decision-making. In response, and based on synergies created between farmers' associations from various sectors and IPMA, a new concept of 'agroclimatic bulletin' was developed which, in the face of the new challenges facing the sector, was intended to be more innovative and technological both in terms of the data sources used and in the way information is made available.
Since 2025, IPMA facilitates digital access to meteorological and agroclimate indicators, empower users in their interpretation, and provide up-to-date information and agroclimate warnings based on established thresholds. This information is accessible through this digital platform, which incorporates detailed information for the various regions of the country, aggregated by different Territorial Units and agricultural areas, based on daily meteorological observation data from the IPMA network (in situ and remote) and numerical weather prediction (numerical model).

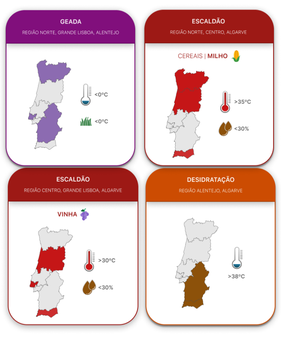


Digital platform
Two information blocks

Agroclimate warnings
Based on indicators identified by the various sectors.
Scope: up to 10 days.
Notification system.

Temporal evolution of the indicators
(*diagnosis and prognosis*)
Observations: Last 15 days.
Daily forecast: Up to 10 days
Weekly trend: Up to 4 weeks (ECMWF).

Agroclimate warnings

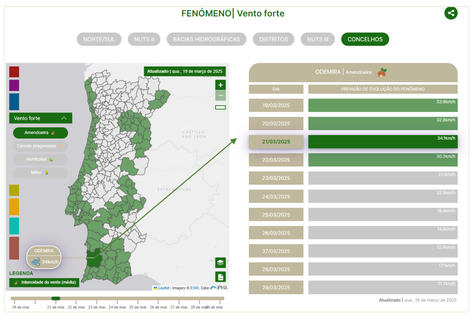


Warning / Agricultural Sector Reports

- **Extreme Temperature** / vineyard, tomato, olive grove, fruit trees
- **Persistent rainfall** / almond, cereals-wheat, walnut, corn
- **Warm period** / rice, corn, cereals-wheat
- **Warm and dry period** / forest
- **Frost** / almond, cereals-wheat, olive grove, raspberry, vineyard
- **Strong wind** / almond, cereals-wheat, vegetables, corn
- **Mildew** / vineyard
- **Cold period** / almond

The table representation allows the consultation of information regarding the forecast for the following days, by region, identifying if there is an agroclimate warning.

- Territorial units: NUTS II, NUTS III, municipalities, river basins, districts.
- Alert period: up to 10 days.
- Indicators: simple or composite.
- Data: exportable to other systems.

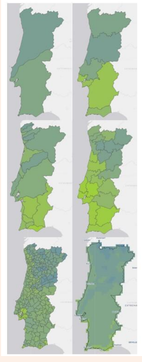


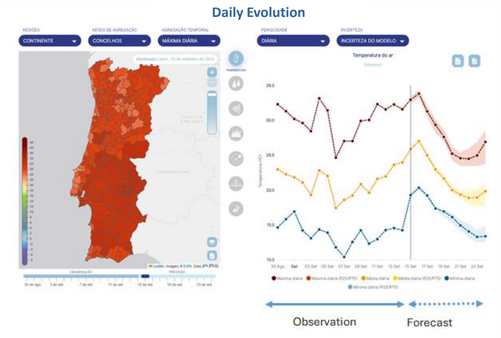
Evolution of the indicators

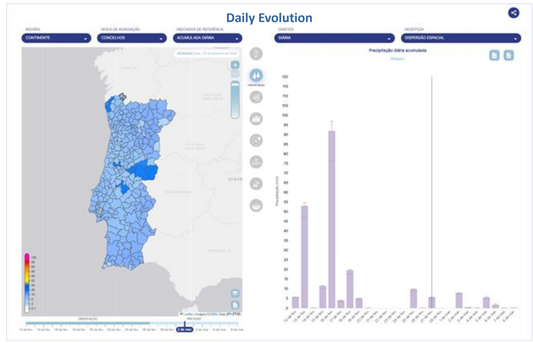
- Territorial units: NUTS II, NUTS III, river basins, districts, municipalities
- Grid visualization
- Data exportable to other systems

Available indicators:

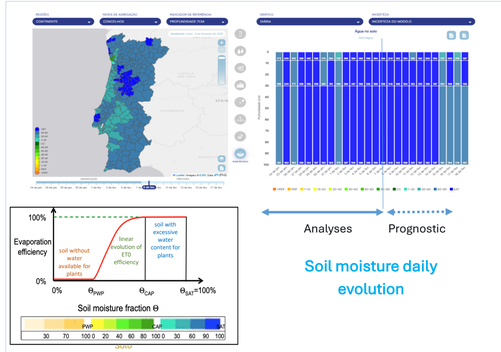
- **Air temperature: average, maximum, and minimum**
- **Precipitation: daily and weekly**
- **Wind**
- **Soil surface temperature**
- **Relative humidity**
- **Evapotranspiration**
- **Cold hours**
- **Soil moisture**







Forecasting key indicators in a meteorological drought situation.



Soil moisture daily evolution

https://dataclima.ipma.pt/pt/homepage/

https://agroclima.ipma.pt/pt/