International cooperation at Italia Meteo: ALBATROSS project

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Agenzia ItaliaMeteo

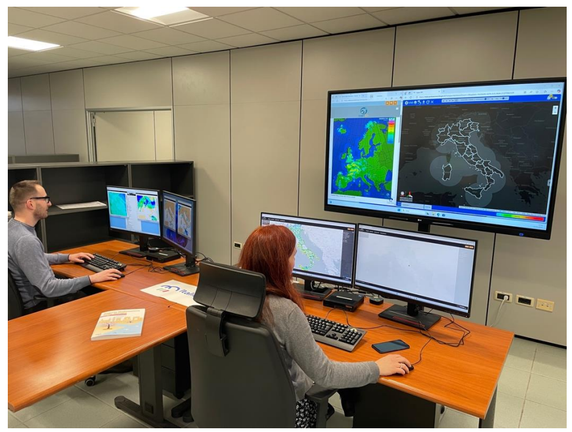
International Cooperation in Applied Meteorology for Reducing Hydroclimatic Risks
14 October 2025 | Istituto degli Innocenti Piazza SS Annunziata - Florence

Agenzia ItaliaMeteo

Agenzia ItaliaMeteo (AIM) is the designated **National Meteorological and Climate Agency for Italy**, established by national law L. n. 205/2017.

AIM is a **public entity** with organizational, accounting, and budgetary autonomy, responsible at the national level for **informative, technical-scientific, and operational activities** in the fields of meteorology and climatology.

The agency is headquartered in Bologna.



The role of Agenzia ItaliaMeteo

Agenzia ItaliaMeteo:

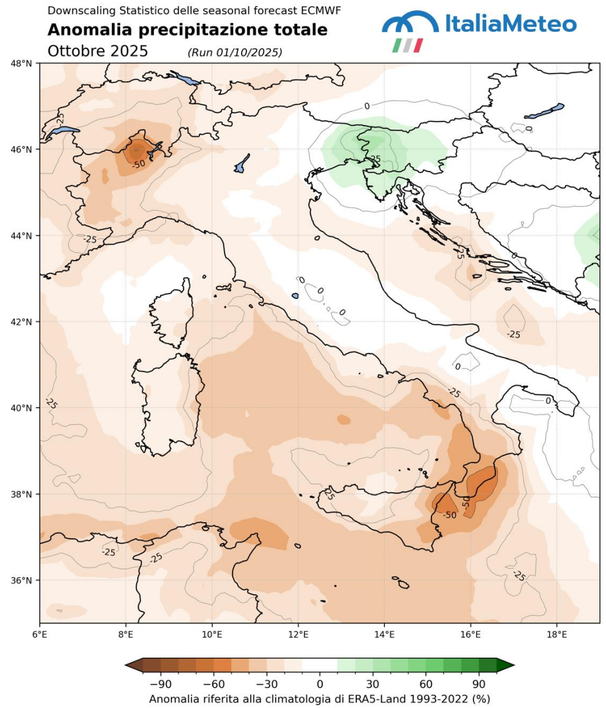
- **coordinates activities in the fields of meteorology and climatology**, supporting national and regional authorities responsible for civil protection, public health, environmental protection, and agricultural policies within their respective areas of competence
- **defines optimal uniform standards** for observational networks, setting technological criteria for quality, frequency, temporal acquisition, and spatial resolution
- **collects and stores observational data**, forecasts, and simulations acquired from Italian meteorological institutions, as well as data received directly from ECMWF, EUMETSAT, ESA, and Copernicus
- **redistributes data, products, analyses, and forecasts** on meteorological, climatological, and marine conditions to the same entities

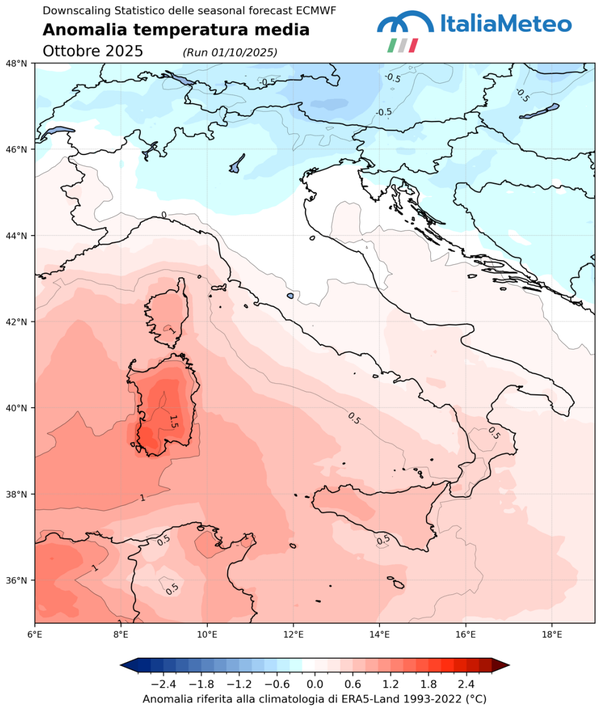
Implementation of climate services

- Climate services (CS) represent the **provision and use of climate data, information and knowledge to assist decision-making** in climate-sensitive sectors with better information to help society understand and respond to/manage climate variability and change
- The demand for CS is constantly **growing**, due to the increasing risk of significant impacts of climate change on society and several economic sectors
- CS include basic climate information and data as well as **operational and customized services for end users**
- The need for adaptation to climate change covers different spatial scales, from **international to national, to local scale**

C3S NCP project – ECMWF tender

ItaliaMeteo Agency is currently engaged in the calibration and downscaling of seasonal and sub-seasonal forecasts for Italy in the framework of the **Climate Change Service (C3S)** project represents a strategic project aimed at promoting the development of hydro-climatic and environmental services based on Earth Observation data, from national to local scales information activities tailored to different types of users and stakeholders.





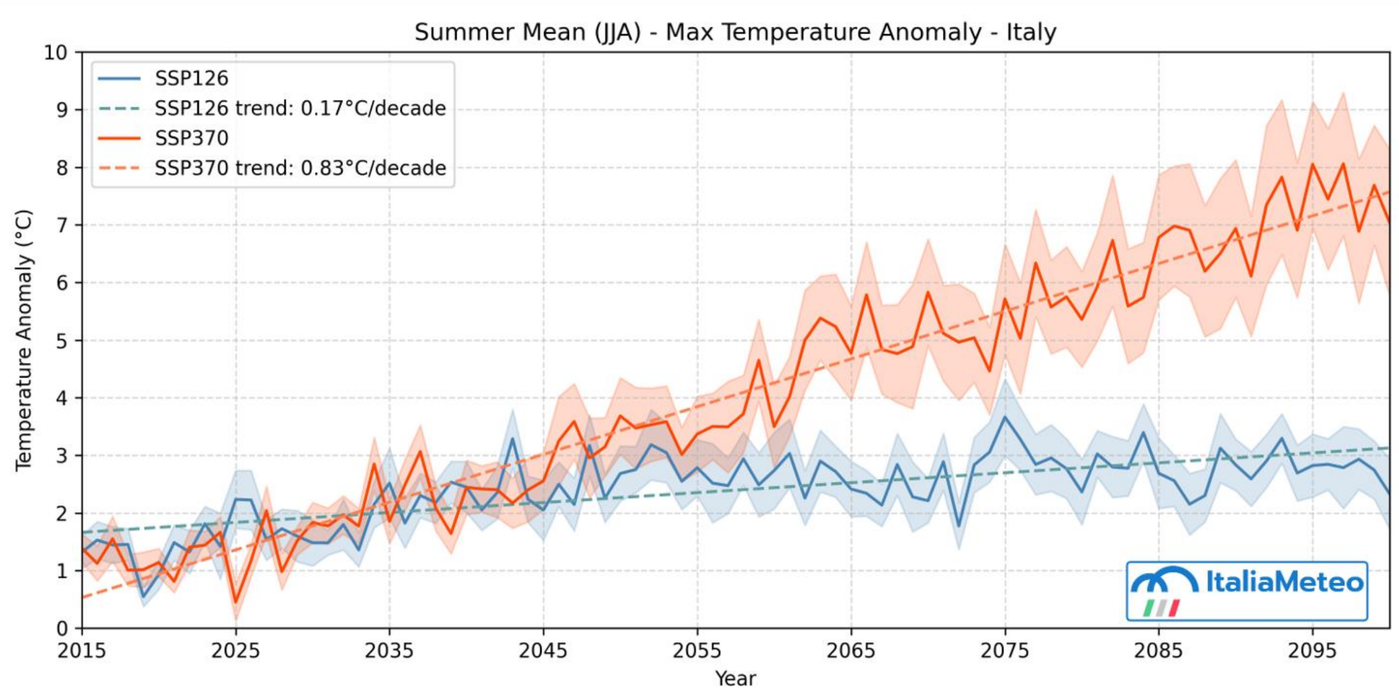
C3S NCP project – ECMWF tender

CLIMATE SCENARIOS downscaled and adapted to the Italian territory

CMIP6 climate projections optimized for Italy under scenarios SSP1-2.6 and SSP3-7.0 up to **2100**, with a **5.5 km resolution**, for the variables: maximum temperature, mean temperature, minimum temperature, mean wind speed, relative humidity, and precipitation.

Comparison between the new SSP scenarios of CMIP6 climate projections and the "old" RCP scenarios of CMIP5 climate projections.

Daily Maximum Temperature – Summer Mean (JJA) over Italy – Anomaly relative to the 1985–2014 climatic average.



- The SSP1-2.6 scenario shows an average trend of +0.17 °C per decade up to 2100.
- The SSP3-7.0 scenario shows an average trend of +0.83 °C per decade up to 2100.
- In the best-case scenario, SSP1 projects an anomaly in the daily maximum temperature, averaged over the whole of Italy, of about **+3 °C** compared to the 1985–2014 climatological mean.
- The SSP3 projection indicates an anomaly in the daily maximum temperature, averaged over the whole of Italy, of about **+7.5 °C** compared to the 1985–2014 climatological mean.

C3S NCP project – ECMWF tender

INDICATOR CALCULATION using the new CMIP6 projections.

CDDs (Cooling Degree Days), **HDDs** (Heating Degree Days), **PRCTOT** (Total Precipitation), **R20** (Number of Heavy Precipitation Days), WD – Warm-Dry Days (in days)

PR99prctile (in %): 99th percentile of daily precipitation for days with precipitation **≥ 1 mm/day**;

RX1DAY (in mm): Maximum value of daily precipitation;

FD – Frost Days (in days): Number of days with minimum daily temperature below 0°C;

FWI – Fire Weather Index: Based on **maximum wind speed**, **relative humidity**, **accumulated precipitation**, and **temperature**. This index includes the calculation of **five sub-indices**: three **primary sub-indices** (FFMC, DMC, DC) representing **fuel moisture**, and two **intermediate sub-indices** (ISI, BUI) representing **rate of spread** and **consumed fuel availability**;

EWS (in m/s): 98th percentile of daily maximum wind speed.

Indicators and tools for the integrated assessment of water resources, heatwaves, and wildfires

Estimate future water availability, develop heatwave projections, assess wildfire risks, and forecast drought events

PNRR IT-WATER - High-performing computing of future drought & water resources scenarios in Italy

IT-WATER project aims to create future scenarios of drought and water resources in Italy using high-performance computational tools. The project includes the:

- pre-processing and bias-correction of high-resolution **climate change scenarios**
- adaptation of **real-world national cryo-hydrologic models** for the HPC environment, long-term runs of these models for a baseline and future scenarios
- computation of **decision-oriented drought indices/indicators** that can help inform decision making in the framework of the adoption of urgent interventions devoted to implementing water scarcity mitigation actions

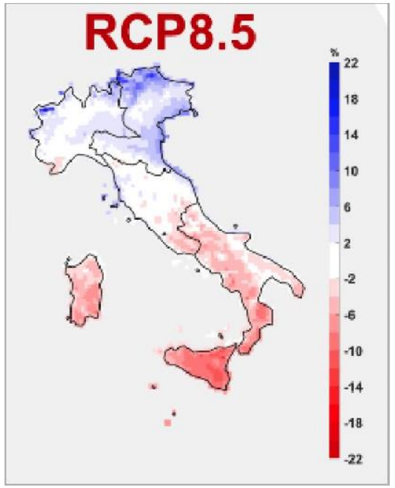
PNRR IT-WATER - High-performing computing of future drought & water resources scenarios in Italy

Drought indices:

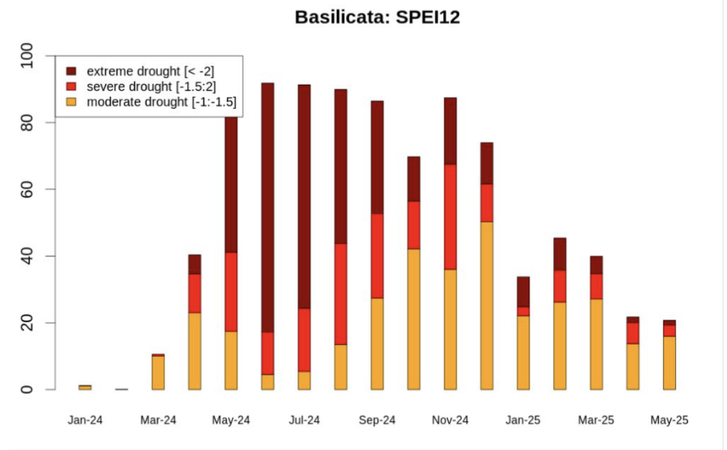
- **SPI** (Standardized Precipitation Index)
- **SPEI** (Standardized Precipitation Evapotranspiration Index)
- **SMA** (Soil Moisture Anomaly)

  - Temporal scale: annual and seasonal.
  - Reference period: 30-year and 10-year intervals.
  - Spatial scale: national, regional, basin, and district levels.

- Change in the number of drought months within the reference period in the agricultural sector
- Variation (absolute or percentage) in the number of exceedances of the moderate or extreme drought threshold.



- Variation (absolute or percentage) in the average territorial extent falling within a specific drought class.



ALBATROSS - Advancing knowldge for Long-term Benefits and climate Adaptation ThRough hOlistic climate Services and nature-based Solutions

ALBATROSS

- Horizon Europe Project
- Coordinator: UNIBO
- 1st March 2024 – 31sr August 2027
- 16 partners: 6 EU and 6 AF Universitirs and Research institutes, 2 NGOs, 2 SMEs

No.	Name	Participant organisation name	Type	Country
1*	UNIBO	Alma Mater Studiorum - Università di Bologna	HEE	Italy
2	UNILI	University of Liege	HEE	Belgium
3	TUDO	Technical University Dortmund	HEE	Germany
4	UNICT	University of Cape Town	HEE	South Africa
5	KNUST	Kwame Nkrumah University of Science and Technology	HEE	Ghana
6	UNIGHA	University of Ghana	HEE	Ghana
7	UNINA	University of Nairobi	HEE	Kenya
8	ARU	Ardhi University	HEE	Tanzania
9	CERED	Centre d'Etudes et de Recherche Économique pour le Développement	HEE	Madagascar
10	FMI	Finnish Meteorological Institute	RO	Finland
11	ITMET	Agenzia Nazionale per la Meteorologia e Climatologia ItaliaMeteo	PO	Italy
12	UNESCO	United Nations Organization for Education, Science, and Culture	IO	France
13	OZA	Oxfam South Africa	NGO	South Africa
13.1	OIT	Oxfam Italia Onlus Associazione (Affiliated to OZA)	NGO	Italy
14	KAJO	Kajo services	SME	Slovakia
15	BONDY	Bondy	SME	Madagascar
16	ELH	Elhuyar	NPO	Spain
17	UNIGE	University of Geneva	HEE	Switzerland

albatross-project.eu/

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ALBATROSS - Advancing knowldge for Long-term Benefits and climate Adaptation ThRough hOlistic climate Services and nature-based Solutions

The ItaliaMeteo Agency role is to develop the community-driven impact-based forecasts covering seasonal-to-interannual predictions for agriculture.

The **iCOLT** climate service:

A system aimed at delivering early crop map over Emilia-Romagna and **probabilistic predictions of crop irrigation water needs for the coming summer**. The system needs as input data:

1. crop map obtained early in the summer season obtained from satellite data analysis;

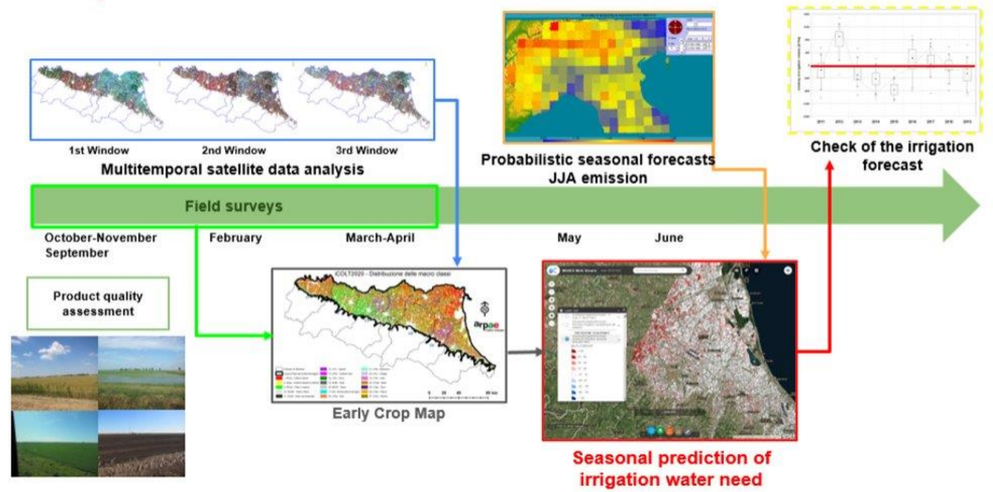
2. regional soil map;

3. gridded weather observed data;

4. gridded weather forecasts (seasonal, subseasonal, weekly)

Seasonal forecasts used as input are obtained by calibrating the multi-model Copernicus seasonal forecast system, while sub-seasonal forecasts are issued starting from ECMWF monthly ensemble operational products.

Users: Land Reclamation Consortia or Emilia-Romagna Region (Department of Agriculture, Environment, etc.) and entities in charge of water management in agriculture



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Local context adaptation

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Climate service FOR-WIN: FORecasts for Water Irrigation Needs

INTERACTIVE BULLETIN:

[MAPS]

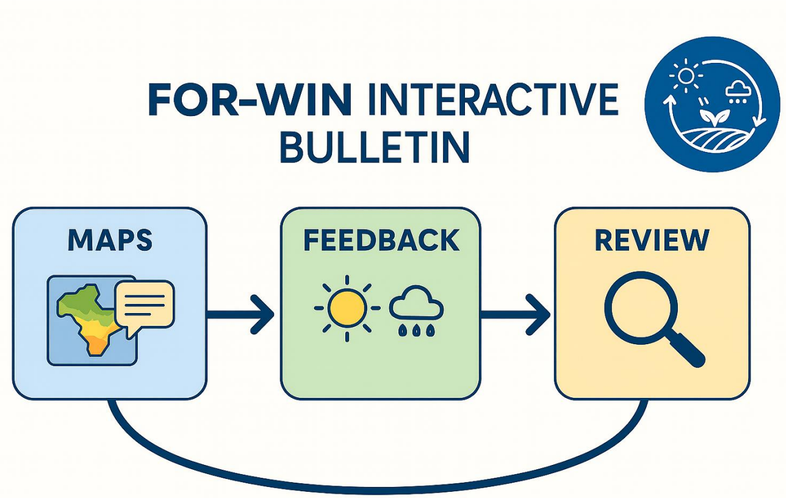
- Provision of SPI and/or SPEI maps and cumulative BIC (hydroclimatic balance) over the last 12/6/3 months, based on reanalysis data, at the national or local scale with monthly or weekly frequency
- Inclusion of an expert commentary to describe the current status of the project's area of interest
- For both maps, qualitative classifications is defined (e.g. three classes: water scarcity / normal conditions / water excess) to make the information easier to interpret for users consulting the service.
- For the SPEI, classification is based on the number of standard deviations (to be defined through climatological data analysis, preferably from direct observations rather than reanalyses)
- For the cumulative BIC, classification thresholds is established by analysing annual yield data correlated with BIC values.

[FEEDBACK]

- The National Meteorological Service provides observed data as feedback to verify the product [MAPS]

[REVIEW]

- Feedback interpretation, revision and fine tuning of the expert commentary.



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Climate service FOR-WIN: FORecasts for Water Irrigation Needs

First results:

Statistical downscalig seasonal forecats

The full operational version of FOR-WIN will be ready soon
STAY TUNED!

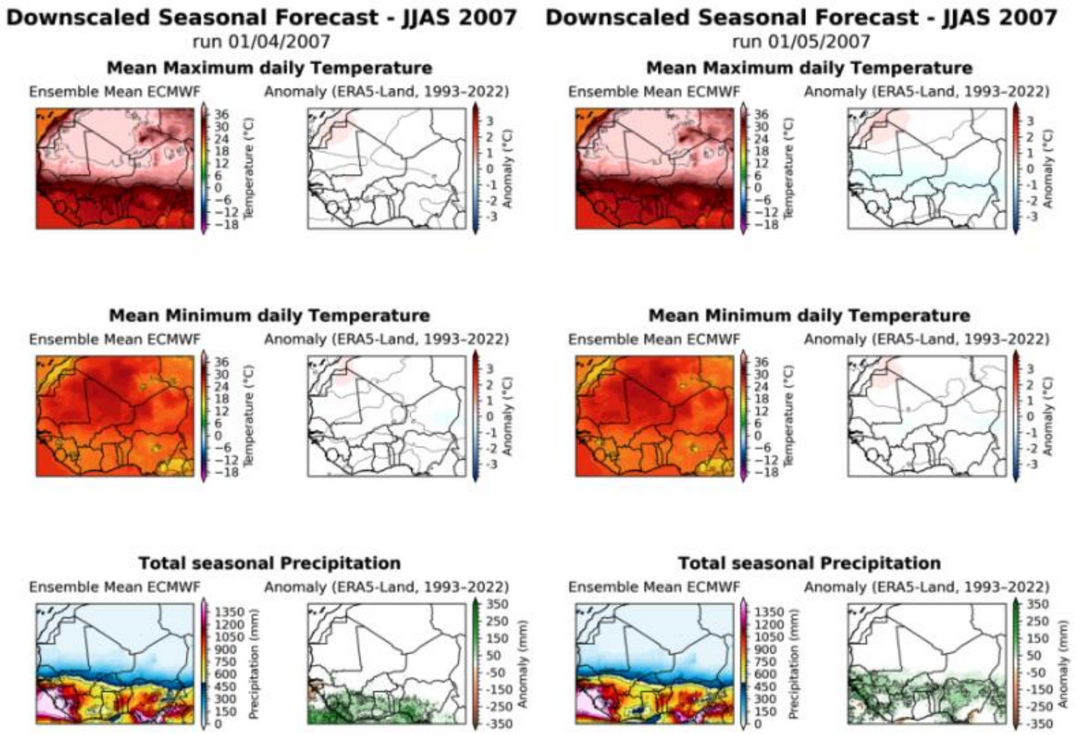

Figure 20: Downscaled seasonal forecast for the JJAS period over the West Africa region in 2007. Two forecast initializations from two to one months in advance are shown. Results represent the median of the 25 ensemble members, with absolute anomalies computed relative to the 1993–2022 ERA5-Land climatology.

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Thank you!

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www.agenziaitaliameteo.it

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