

Weather API: From Challenges to Informed Action

: meteo matics

Name of the Organisations Involved

- Meteomatics GmbH, Germany
- Meteomatics AG, Switzerland
- Utopicus Glòries Sala Glòries, Spain

Challenges Identified

Agriculture faces numerous challenges related to weather conditions, significantly impacting crop yield, livestock farming, indoor growing, and the broader industry due to climate change. Unpredictable weather events such as heat waves, severe winters, and extreme precipitation can lead to crop failure and livestock losses. Accurate weather data plays a crucial role in optimizing planning for irrigation, fertilization, and pesticide application, contributing to increased crop quality and financial savings. Livestock welfare is affected by weather conditions, influencing animal health and milk production. Adequate sheltering and provision of water and food become critical with the help of precise weather forecasts. Greenhouse cultivation, although controlled, is still influenced by external weather conditions, necessitating efficient management of light, temperature, and humidity. Climate change further intensifies challenges, with rising temperatures, altered precipitation patterns, and extreme events disrupting global supply chains.

Goals and Solution

Incorporating climate projection data into agricultural practices becomes essential for stakeholders to navigate the evolving landscape effectively. Farmers can use weather data to make informed decisions about planting, harvesting, and irrigation.

Meteomatics is an international company, which specializes in high-resolution commercial weather forecasting, power output forecasting for wind, solar and hydro, weather data gathering from the lower atmosphere using Meteodrones, and weather data delivery via the Weather API.

Weather API (Application Programming Interface) acts as an intermediary, enabling software applications to access real-time, forecasted, and historical weather information. These APIs pull data from numerous meteorological stations, satellites, radars, and other weather data sources, providing comprehensive weather details in a structured and easily accessible format. A Weather API typically works over the web, using HTTP requests to communicate with the API server. When a request is made, the API fetches the requested data from its sources and returns it in a user-friendly format, often JSON or XML. This process allows for the easy integration of weather data into websites, mobile apps, and other software applications.

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Actions taken

The Weather API serves as a valuable tool for farmers, offering a wealth of data on crucial parameters that directly impact agricultural activities. Here's a breakdown of key variables and the actionable insights they provide:

Soil:

- Frost Depth: Monitor frost depth to determine the potential impact on sensitive crops. Consider protective measures for frost-prone plants.
- Soil Frost: Stay informed about soil frost occurrences, especially during critical growth stages. Adjust planting schedules accordingly.
- Soil Moisture Index: Manage irrigation practices based on the soil moisture index to ensure optimal water conditions for crops.
- Soil Moisture Deficit: Address soil moisture deficits promptly by adjusting irrigation schedules or implementing water conservation measures.
- Soil Water Content: Gauge soil water content to fine-tune irrigation, promoting efficient water use in agriculture.
- Ground Temperature: Track ground temperatures to optimize planting times and enhance seed germination.

Precipitation:

- Accumulated Precipitation: Plan irrigation and harvesting activities based on accumulated precipitation data for better water management.
- Precipitation Probability: Anticipate potential rain events and schedule farming activities accordingly.
- Fresh Snow: Prepare for the challenges of fresh snow, especially in regions susceptible to heavy snowfall.
- Snowfall Probability: Stay alert to the likelihood of snowfall and its potential impact on crops and farm infrastructure.
- Snow Cover Probability: Monitor snow cover probability for insights into ground conditions and potential delays in fieldwork.
- Snow Depth: Consider snow depth in planning operations, particularly if snow removal is necessary.
- Hail: Implement protective measures for crops in the event of anticipated hailstorms.

Global Radiation:

- Direct Radiation: Leverage direct radiation data for optimal crop positioning and sunlight exposure.
- Diffuse Radiation: Understand diffuse radiation patterns for improved crop canopy management.
- Sunshine Duration: Plan farming activities based on sunshine duration to maximize photosynthesis and crop growth.
- Sunrise and Sunset: Align daily farming schedules with sunrise and sunset times for efficient use of daylight.

Wind:

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• Wind Speed and Wind Gusts: Prepare for windy conditions by securing crops and structures. Adjust planting and harvesting schedules accordingly.

Weather Warnings:

• Act promptly on weather warnings to mitigate risks associated with frost, snow, wind, thunderstorms, heavy rain, and incessant rain.



Source: <u>https://www.meteomatics.com/en/weather-api/</u>

By incorporating these insights into the farming practices, farmers and agricultural organizations can enhance operational efficiency, optimize resource utilization, and proactively manage weather-related risks on your farm.

In addition, stakeholders can receive detailed information on specific weather parameters, enabling a comprehensive understanding of environmental conditions. These parameters include:

- Evapotranspiration the sum of water evaporation and transpiration from the surface area to the atmosphere. Application: Crucial for assessing water loss and optimizing irrigation practices.
- Growing Degree Days (GDD) measures heat accumulation and is employed to estimate the growth and development of crops and pests during the growing season. Application: A vital tool for predicting key stages in crop development.
- Grassland Temperature Sum a specialized form of GDD that gauges the accumulation of mean day temperature, aiding in determining the start of field work after winter. Application: Critical for scheduling agricultural activities based on temperature thresholds.
- Leaf Wetness indicates the amount of dew left on surfaces. Application: Essential for disease prediction and optimizing plant health.
- Phytophthora Negative Prognosis an index indicating the necessity of safety measures against potato blight; no measures are required if the index is below 150. Application: Offers a proactive approach to disease management in potato cultivation.
- Disease Prevention (Mildew, Oidium)- addresses measures to prevent common diseases such as mildew and oidium. Application: Promotes preemptive strategies for maintaining crop health.

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 Most Similar Year - Identifies the year with conditions most similar to those of the queried year. Application: Assists stakeholders in drawing insights from historical data for effective decisionmaking.

This detailed information empowers stakeholders with the tools needed to make informed decisions, manage risks, and optimize agricultural practices in response to specific weather conditions.

Benefits and Impact

Weather APIs serve as invaluable tools for farmers, enabling them to make well-informed decisions throughout the farming process. From planting and harvesting to irrigation, farmers utilize real-time weather forecasts to optimize their agricultural activities. This data-driven approach enhances efficiency and productivity, contributing to the overall success of agricultural operations.

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Application Area Weather

Digital Technology in the Value Chain ⊠ Agricultural Inputs and Services

Agronomic Services

Digital Technologies ⊠ Big data ⊠ Drones and AGVs

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