Weather Data for Cocoa Trading

How Meteomatics Supports Stakeholders in the Agricultural Sector

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Executive Summary

Meteomatics supports agriculture stakeholders by providing them with insights on weather trends and patterns that help in forecasting production volume and trading opportunities. In this paper, we explore how cocoa traders can use Meteomatics' seasonal forecasts and climate projections to gain a better understanding of its effects on cocoa production. By leveraging our data, they can anticipate weather-related challenges that could impact cocoa production or identify opportunities in areas with favourable weather conditions for cocoa production, allowing them to secure more favourable contracts.

Weather Data for Cocoa Trading

The ancient pre-Columbian civilisations of Mesoamerica, such as the Mayans and Aztecs, revered cocoa as a divine gift. They used it to create a bitter beverage called *chocolhaa* or *xocolatl*, which was consumed by the elite during sacred rituals and was even used as a form of currency. In 1545, it was recorded that a Mayan in central Mexico could trade 100 cocoa beans for a good turkey hen, or just 3 beans for a turkey egg.

To this day, nearly 500 years after the fall of the Mayan and Aztec empires, chocolate lovers around the world continue to value and appreciate it. In 2022, the global chocolate market was valued at a staggering USD 127.7 billion, and it is expected to reach an even greater height of USD 165.35 billion by 2028.

With such high demand, mass cocoa production and trading are more complex now than it was in 1545. The cocoa industry is susceptible to disruptions caused by various factors such as weather, crop diseases (largely influenced by weather patterns), and geopolitical issues, which can upset the supply-demand balance and result in price fluctuations.
Meteomatics offers valuable insight to traders, providing them with up-to-date weather forecasts for key cocoa production regions.

Utilizing Accurate Weather Data to Optimize Cocoa Trading Strategies and Enhance Decision-Making

The cocoa tree yields fruit continuously throughout the year. It requires specific growing conditions to thrive, including temperatures between 20°C and 32°C, plenty of shade, regular rainfall and moisture, and protection from wind. These conditions are typically found in the rainforest regions within the cocoa belt, which stretches from 20 degrees north to 20 degrees south of the equator. The leading producers of cocoa are Côte d'Ivoire, Ghana, and Indonesia, with Côte d'Ivoire and Ghana producing over half of the world's chocolate.

The expected rise in temperatures due to climate change in the coming decades may increase the uncertainty for cocoa cultivation. The primary concern is that rising temperatures may lead to increased evapotranspiration, causing soil and plants to lose more moisture, without a corresponding increase in rainfall to offset the loss. Furthermore, climate change will have a ripple effect on other species that coexist in agroforestry systems and on the pollinators, pests, and diseases that affect cocoa.

Industry players must thus pay close attention to weather forecasts in both the short and long term. Accurate and reliable weather data is essential for making informed decisions regarding production forecasts and negotiating trading contracts. Weather data directly impacts the financial performance of trading companies, triggering substantial profits or losses. Choosing a reputable and trustworthy weather data provider is therefore a critical aspect of risk management and business success.

Weather API

All the plots in this article were created using data from our Weather API, which provides simple and direct access to high-resolution downscaled global weather data.

The API allows you to quickly and easily integrate relevant weather data into your business tools and services, and even into visualisations through its WMS/WFS capability. Open-source data connectors are available for free on GitHub for all common programming languages and can be output in various file formats.

The API includes over 1800 parameters, including derived parameters for the agriculture industry:

- Evapotranspiration
- Growing degree days
- Grassland temperature sum
- Leaf wetness
- Phytophthora negative prognosis
- Disease prevention
- "Most similar year"
- Soil (e.g., soil temperature)
- And many more

Weather Data for Futures Cocoa Trading

Cocoa futures contracts are negotiated up to two years in advance. To assist traders with long-term planning, Meteomatics provides seasonal forecasts that extend up to 7 months in advance. Our models are calibrated with station measurements and undergo a post-processing 90m downscaling treatment to ensure even better local forecasts.

Additionally, we offer climate projections that extend until 2100, based on the latest version of the Earth System Model of the Meteorological Research Institute of Japan (MRI). This allows traders to make more informed decisions, taking into account potential future weather patterns.

To demonstrate the capabilities of our API and the wealth of information it provides, we have generated plots that display a seasonal forecast and climate projections for Soubré, one of Côte d'Ivoire's primary cocoa production regions.

Figure 1 Analysed grid around the region of Soubré in Côte d'Ivoire

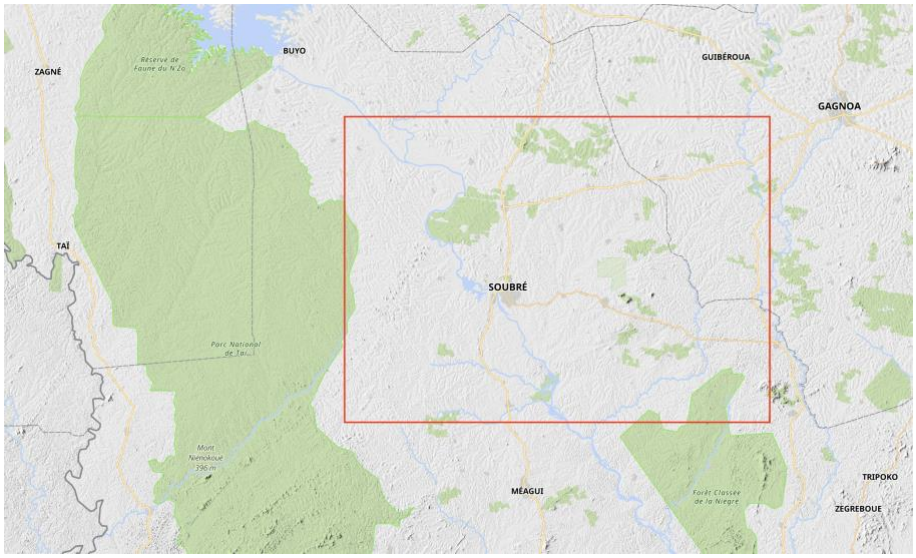
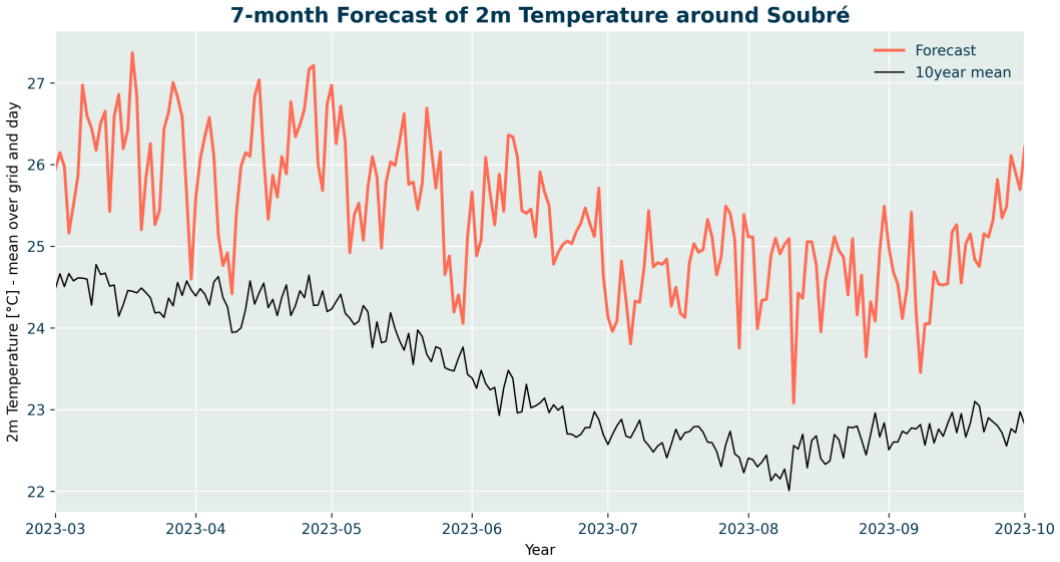
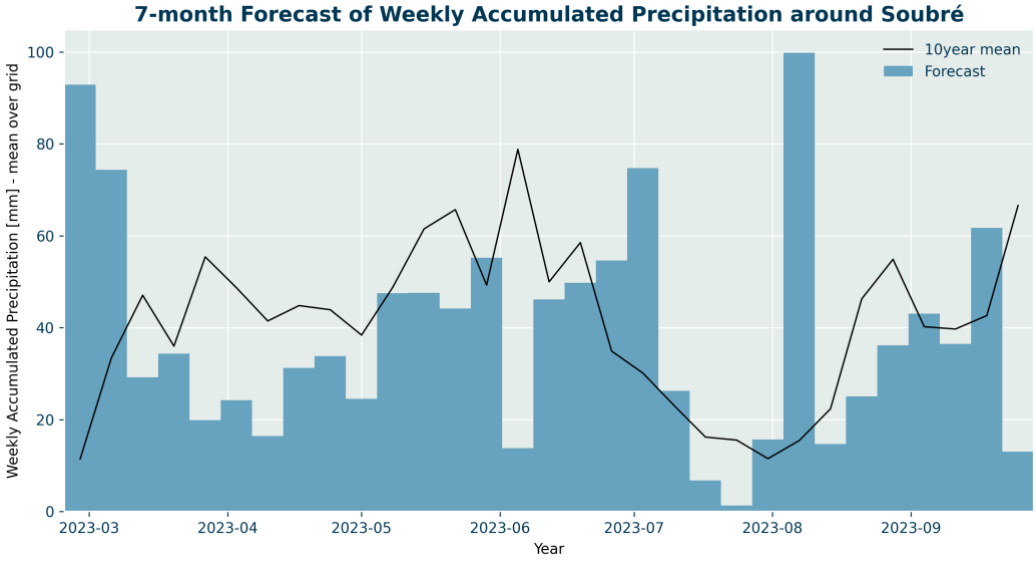


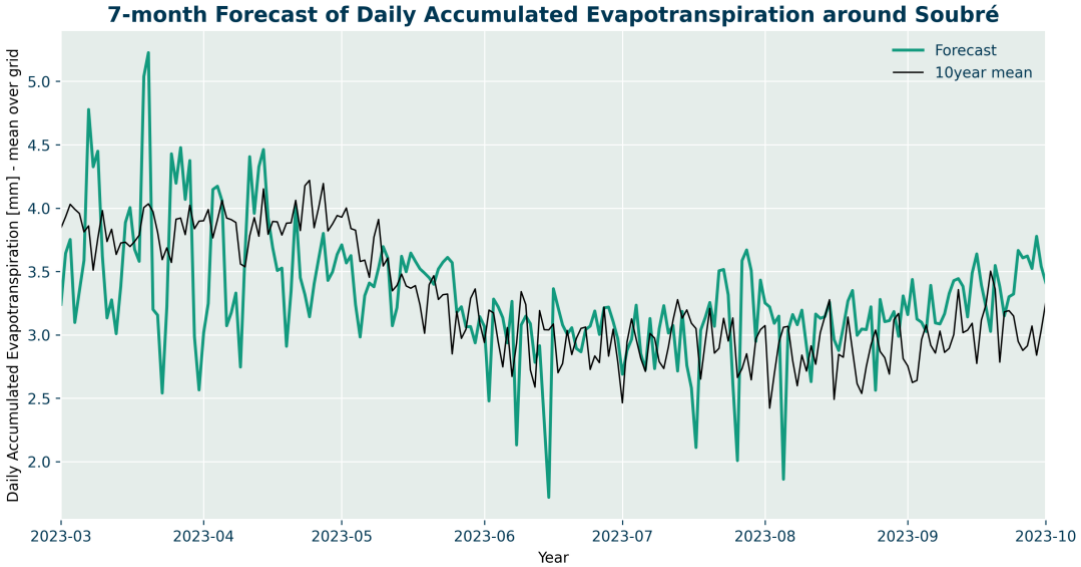
Figure 2 Zoomed in analysed grid around the region of Soubré in Côte d'Ivoire.

Seasonal Weather Forecasts for Cocoa Trading

In contrast to the global weather models, the grid points of local weather models are much closer together. The usual range is 1 - 15 km. The rule is: the closer, the better the resolution of the individual models. This requires a lot more computational capacity and is therefore only calculated for a period of one to three days.





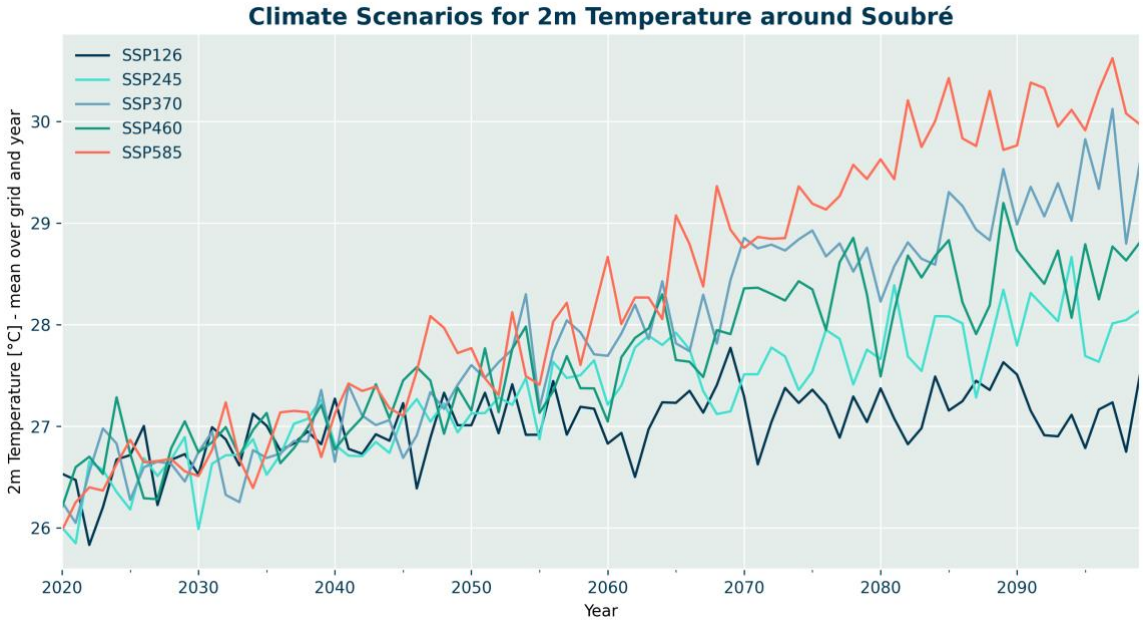


Over the next seven months, we anticipate a temperature that surpasses the average of the previous decade. However, the temperature will remain within the ideal range for cacao plants to thrive. Additionally, we predict precipitation and evapotranspiration levels will remain consistent

with the average for this time of year over the past ten years and thus we expect that despite the larger temperatures plants will not suffer more from water stress (which would lead to reduced yields and poor quality cocoa beans).

Many more parameters relating to crop production can be queried through our API, such as wind and humidity, and other derived parameters for the agriculture industry, such as growing degree days, sum of grassland temperature, leaf wetness, phytophthora negative.

Climate Projections for Cocoa Trading



All climate scenarios project a rise in temperatures for the Soubré region, starting as early as the present decade. In the most severe scenario, SSP585, temperatures are projected to exceed 32°C from the 2080s onwards, which is suboptimal for cocoa plants. However, in all other scenarios, temperatures are projected to remain below that threshold, which falls within the ideal range for the plants. As time goes on, it will be necessary to analyse temperature data in conjunction with precipitation and evapotranspiration data to determine how the weather conditions will affect production.

We provide access to all of this data through our Weather API, which offers a centralised access point to a global database of weather data that is faster and more efficient than traditional weather database systems.

Learn more about the Weather API

Weather Data for Short-Term Cocoa Trading

Weather projections have a significant impact on the fluctuation of cocoa prices in the futures market, which, in turn, may affect the prices for short-term trading.

In addition, weather can also affect short-term trading by disrupting the supply chain. Extreme weather events that lead to transportation disruptions or harm the quality of the beans can suddenly cause prices to spike.

Meteomatics can provide real-time information on storms, high winds, tropical cyclones, and other extreme weather events that can disrupt the supply chain.

Meteomatics for the Agriculture Industry

The weather plays a crucial role in the success of agriculture, from determining crop yields to impacting livestock and indoor growing operations. At Meteomatics, we understand the importance of accurate weather data for both food traders and farmers. That is why we offer a range of solutions specifically tailored to the needs of the agriculture industry.

To learn more about these offerings, please visit our Solutions for the Agriculture Industry page.

Solutions for the Agriculture Industry

European Weather Model for Agriculture

Our in-house weather model, EURO1k, boasts exceptional precision in generating weather forecasts for fields in Europe. With a resolution of 1 km, it far surpasses the standard global resolution of 20 km and is the only model in Europe capable of capturing even the smallest meteorological events, such as thunderstorms, hail, and storms.

Utilising advanced downscaling algorithms and the most accurate geodata, EURO1k even achieves resolutions of up to 90 metres. The European weather model is continually updated hourly with the latest weather data, enabling farmers and traders to make more informed decisions by evaluating the impact of weather on crops at a much finer scale.

For a more detailed look at the technical specifications, please visit our dedicated EURO1k page.

EURO1k

Talk to Our Experts

Our team of experienced meteorologists is always seeking new challenges and is dedicated to developing industry-specific solutions that meet the unique needs of our customers. Whether you have a specific project in mind or simply want to learn more about how we can help, we would be happy to speak with you.

Our team of meteorologists, engineers and sales managers are happy to help you with any questions you may have.

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More Products and Services

Weather API

With our weather API you get continuous access to worldwide high-resolution weather, ocean, environment and climate data as well as historical data, real-time data, forecasts and climate scenarios up to 2100.

Please note that EURO1k is not included in the regular API access.

Weather API

Weather Visualization – MetX

Visualise all weather events in a high-resolution map view - with our web-based weather map tool MetX based on the Weather API.

MetX

Weather Data Shop

If you only need one-time access to certain weather data, you can directly download individual weather data sets from our weather data shop. You will find a comprehensive selection of current and historical weather data as well as sector-specific weather parameters.

Data Shop

Weather Drones – Meteodrones

Our Meteodrones offer the possibility to collect weather data from the lower and middle atmosphere. With Meteodrones, it is possible to carry out high-resolution and direct measurements of temperature, humidity, air pressure and wind, to incorporate these into weather model calculations and thus demonstrably improve weather forecasts.

Meteodrones