Agriculture Use Case

JUPITER™

Jupiter Enables Growers and Food Producers to Optimize Resilience Planning With Flexible, Hyper-Local Analysis of Multiple Climate Risk Perils

The agriculture industry and global food supply confront mounting challenges from more frequent and more severe weather events driven by climate change

Climate change poses a massive challenge to global agriculture—and a threat to food security in both the developed and developing world.

Food growers and foresters are vulnerable to the full range of climate change-driven perils: flooding, wind, heat, wildfire, drought, extreme precipitation, and hail. Higher temperatures and severe drought reduce yields of desirable crops, degrade the quality of soils, and encourage the proliferation of pests, pathogens, and weeds. Changes in precipitation patterns increase the likelihood of crop failures and long-term production declines. Extreme heat and high humidity threaten the health and safety of agricultural workers. Supply chains and warehousing, processing, and distribution processes can be disrupted or destroyed.

The Food and Agriculture Organization of the United Nations warns that "without urgent action, climate change will continue to put food production at risk, particularly in countries and regions that are already highly food insecure." In the developed world, the Union of Concerned Scientists calls the combination of advancing climate change and existing industrial agriculture practices a "'perfect storm' that threatens farmers' livelihoods and [the] food supply."

This storm is approaching faster than anticipated. In November 2021, an international study by the Agricultural Model Intercomparison and Improvement Project (**AgMIP**) warned that warming temperatures will reduce the production of corn (maize), soybeans, and rice in regions where they're currently grown—with the drop in corn yield beginning by 2032. These projections include areas where these crops are grown today in North America. "Current food production systems," the researchers conclude, "will soon face fundamentally changed risk profiles."[1]

To prepare for this onslaught of disruption, growers need a clearer understanding of potential physical climate impacts from both extreme weather events and chronic conditions, at a granular, microclimate level, tailored to their specific geographies, crops, and requirements. Jupiter's forward-focused, very-high-resolution physical climate analytics solutions—based on best-in-science climate models, appropriate downscaling techniques, and machine learning—deliver that understanding.

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[1] Jägermayr, Jonas, et al., _Climate Impacts on Global Agriculture Emerge Earlier in New Generation of Climate and Crop Models_, Agricultural Model Intercomparison and Improvement Project (AgMIP), Nature Food, November 2021

Jupiter ClimateScore™ Global's multi-peril, very-high-resolution physical risk analysis at the microclimate level empowers growers to make crucial decisions

ClimateScore Global offers agriculture-related businesses, from food producers to wineries to forestry and lumber companies, support for the critical processes that help them sustain and optimize the management of their fields, orchards, vineyards, forests, and overall value chains. These processes include:

Climate risk assessment

Hyper-local (microclimate-scale) assessment of acute and chronic physical risk from climate change across their portfolios from weather conditions and extreme events such as heat and cold waves, drought and water stress, flooding, extreme precipitation, wind, wildfire, and hail. ClimateScore Global renders very-high-resolution (90m) probabilistic projections for any point on the planet's land surface, over multiple time horizons at five-year intervals through 2100, and across different emissions scenarios.

Crop/asset rotation, location, and selection

With ClimateScore Global, growers can assess potential changes to growing conditions over time, modify rotation strategies, locate assets in less-impacted fields or orchards or geographies, or change their product mixes.

Worker health and safety

Jupiter's metrics include the frequency of breaching critical thresholds of WetBulb Globe Temperature, a worldwide standard that measures heat stress to humans due to temperature and humidity.

Pest and pathogen control

Warming temperatures allow insects, pathogens, and weeds to thrive in formerly inhospitable climates; growers must adjust to the new threats they pose. ClimateScore's insights can inform mitigation strategies.

Irrigation and drainage system modification

Changes in precipitation patterns, and the resulting floods or droughts, may demand new infrastructure investment. Jupiter analytics help prioritize capital investments.

Supply/value chain optimization

Changing weather patterns affect all aspects of agricultural production: processing, packaging, warehousing, and distribution. Understanding, via Jupiter's analysis, the impacts of a changing climate on the logistics and value chain infrastructure is crucial for many growers.

Market opportunity identification

Warming temperatures extend growing seasons in geographies closer to polar regions, sustaining, for example, soybean farming in Russia's vast north, and wine production in the U.K. This trend may be significant for wheat production: the 2021 AgMIP study found that, of the major food crops, only wheat yield may experience global growth, particularly within higher-latitude regions. This creates opportunities for growers in those regions, or for potential asset relocations. ClimateScore helps growers identify and weigh their options.

Jupiter's key advantages for users in agriculture industries

Jupiter ClimateScore Global is ideal for these applications for five key reasons:

1. Its projections are based on **rigorous climate, weather, ocean, hydrological, and data science.**

2. Its **transparent methodologies** combine the world's most respected physical models of the atmosphere and hydrosphere; cloud-computing-enabled downscaling techniques; machine learning; land use and elevation data; extensive observations illuminated by novel data sources such as satellite, air, and ocean- and land-borne sensors; and integrated, robust verification and validation processes.

3. Its **high-resolution modeling of microclimates**, driven by machine learning, helps detect variations across small regions, and enable Jupiter ClimateScore Global to drill deeply to analyze individual locations.

    -   In addition, ClimateScore Global can be used to create **customizable indices** to better reflect risk across wider regions and support technical due diligence when assessing the future viability and investment in agricultural assets such as farms; this enables it to compare, for example, Napa and Sonoma counties, or California's Central Valley to Central Oregon.

4. Its **flexible high- and low-temperature thresholds** can be adjusted and map to the needs of a particular crop and/or the range of a particular pest.

5. Its **support of quantified uncertainty** and detailed model, scoring, and loss methodology minimize model risk.

About Jupiter

Jupiter Intelligence™ is the global market, science, and technology leader in physical climate analytics for risk management and resiliency planning.

Jupiter analytics are used across the private and public sectors. Customers include at least one of the world's five largest firms in insurance, asset management, banking, chemicals, minerals and mining, oil and gas, pharmaceuticals, power, and reinsurance—as well as critical departments and agencies within both the United States government and climate-change-vulnerable geographies around the world.

In addition, the Jupiter Promise is a global partnership with non-government organizations (NGOs) designed to provide climate analytics at little or no cost to improve resilience for the planet's most vulnerable and underserved populations.

Jupiter's enterprise-grade solutions together form the world's only global-to-street resolution climate analytics offering. In addition to ClimateScore Global's portfolio-scale analysis, the Jupiter ClimateScore Planning suite delivers ultra-high-resolution projections of peril-specific climate impacts on individual assets, facilities, neighborhoods, and communities.

For more information, please visit https://jupiterintel.com or email us at info@jupiterintel.com.