CropProphet

Weather Forecast Models Available in CropProphet

CropProphet clients utilize four primary weather forecast models commonly referenced by grain traders. They are the ECMWF, ECMWF-Extended, GEFS, and GFS models. We describe below a few model details to provide an overview of each one. Weather forecasting depends on our understanding of the physics of the atmosphere. Weather forecasts are created by using computers to simulate future periods using atmospheric equations of motion, which describe the physics. The forecasts are started by estimating the instantaneous current conditions of the atmosphere at specific time.

A specific terminology is used to discuss the forecasts produced. The initialization date is the date from which the forecast starts. The cycle time, which is generally 00Z (i.e., midnight UTC time) and 12Z, marks the time of the initial conditions used to start each forecast. The valid date(s)/time(s) is the time over which the forecast is valid for. The lead time is the number of days into the future the forecast is valid for. CropProphet's 15-day models are valid for days up to 15 days into the future, for example.

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ECMWF
The European Centre for Medium-Range Weather Forecasts (ECMWF) is a global model that provides medium-range (i.e., up to a 15-day lead time) global weather forecasts. The ECMWF model provides a 51-ensemble member forecast. Each of the 51 ensemble members are equally probable possible outcomes of the future. These are created because it's impossible to perfectly know the global, three-dimensional initial conditions to start the forecast. This uncertainty is addresses by slightly changing the initial conditions 50 times to create 51 different forecasts. Most forecasts available are the average of the 51 members. ECMWF forecasts weather variables up to 15 days in advance and is updated multiple times a day with a temporal resolution ranging from 1 to 6 hours. The weather forecast output is averaged into daily data for use in CropProphet.

ECMWF – Extended
The ECMWF-Extended model forecasts potential weather conditions up to 46 days ahead. It focuses on weekly averages and compares these to long-term climatology to highlight deviations. This model utilizes 101 ensemble members and is updated once a day at 00z. While the skill of the forecasts beyond a 15-day lead time is limited, these forecasts are provided by grain market participants regularly consult these forecasts.

GEFS
The Global Ensemble Forecast System (GEFS), developed by the National Centers for Environmental Prediction (NCEP), generates 21 ensemble members. It forecasts to a lead time of 16 days in advance and updates four times daily with a 6-hour temporal resolution, starting at 00:00 UTC.

GFS
The Global Forecast System (GFS), also operated by NCEP, does not use ensemble members. It forecasts weather up to 16 days in advance and updates four times daily with a 6-hour temporal resolution, starting at 00:00 UTC. Users should be cautious using the GFS, as its accuracy decreases significantly over time due to its reliance on a single forecast run. The GFS is widely

used by the grain market because of its high temporal resolution. Despite this limitation, the GFS is popular in the grain market due to its high temporal resolution and frequent updates, which are crucial for tracking evolving weather conditions.

Weather Forecasts vs. Crop Yield Forecasts

CropProphet provides its customers both crop weather forecasts and weather-based crop yield forecasts. Grain traders may have difficulty interpreting the impact forecasted weather conditions, if they happen, will have on grain yields. CropProphet provides a "weather forecast impacted grain yield forecast." This capability interprets the impact of the weather forecasts on grain yields in a systematic, objective manner to enable improved interpretation of the weather forecast information.