Agronomic Insights That Makes Weather Data Meaningful

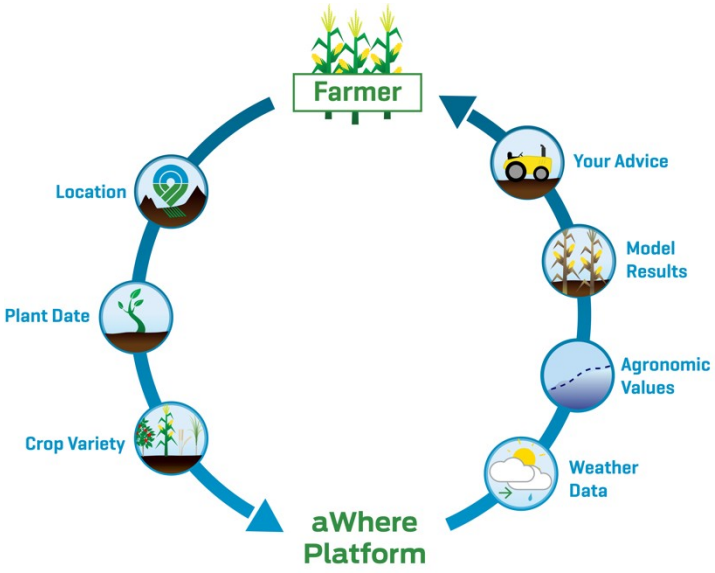
aWhere's view of agriculture intelligence places a heavy emphasis on making weather data meaningful. We provide more than basic figures; we offer out-of-the-box metrics and models that interpret that weather data specifically for agricultural decisions—from food production to commodities trading. Displaying weather data alone is a good starting point, but with a little extra insight from aWhere, your application can unlock deeper more valuable insights for your users.

- Data-driven insight is all about context, often from previous experience. Providing your farmers with accumulated precipitation, and comparing it to the previous year or long-term norms, provides context for their decision-making *this* year.
- A metric may show a region received 100 mm of rain in the last month, but that can be terribly misleading if that rain all came on a single day. Using P/PET (see below), one can identify trouble that weather data alone may miss.
- Knowing the likely stage of a plant's development can help you fine-tune input recommendations to when they are most strategically, improving a farmer's ROI by helping them use inputs only at the most strategic moments.

aWhere's Agronomic Values interpret weather data for better decisions at every field

Agronomic Values answer the "so what?" question that immediately follows a weather report. Knowing the temperature, is a starting point, but what does it mean if there is enough heat to spur plant growth but also quickly dry out the land?

Agronomic Values layer on the insight to better understand what the weather means for any given field. aWhere offers a number of agronomic values, pre-calculated and ready for easy integration to your application.



Growing Degree Days (GDDs)

Also called Growing Degree Units (GDUs), this is a measure of heat and directly correlates to plant development. It's derived from the minimum and maximum temperatures, adjusting for the minimum temperature required for any plant growth. Tracking GDDs can predict when a plant will enter various growth stages or be ready for harvest. There are many ways to calculate GDDs, and aWhere's API offers four equations with customizable parameters (with more equations coming soon). We use GDDs in a number of agronomic models—from growth stages to pest risk indices.

Potential Evapotranspiration (PET)

Water in the ground eventually disappears; PET uses a number of weather attributes to gauge the likely loss of water as a result of evaporation or use by a plant (transpiration). When PET is high, it means water more quickly becomes unavailable for a crop. Combined with knowledge of a plant's aridity tolerance, PET can gauge whether a field is at risk for reduced yield or other problems. aWhere uses the Penman-Monteith Equation to calculate PET. Crop-specific ET modeling will be available from aWhere soon.

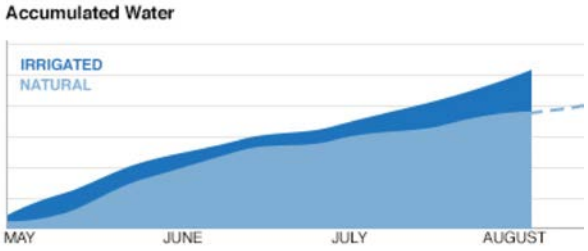
Ratio of Precipitation to PET (P/PET)

P/PET indicates whether enough rain has fallen to replenish the water lost as a result of maximum evapotranspiration. Depending on a crop's drought tolerance, a farmer may irrigate or take other actions to mitigate yield loss. At the regional level, P/PET can indicate threats to the supply chain.

Accumulated GDD, Precipitation, PET, P/PET

Tracking daily heat, rain, or PET is a good starting point, but we also provide daily and total accumulations of GDDs, Precipitation, PET, and P/PET starting from any date, or automatically from a planting date if one is saved in the platform. This provides seasonal insight into available resources, and creates context to better interpret the impact of a particularly dry or cold weak.

Accumulation Example



Layering irrigation totals on top of accumulated rain can better highlight resource use or conservation.

Long-term norms for Agronomic Values provide even more insight by comparing to what farmers already remember

Agronomic Values go a long way at interpreting weather data in a meaningful way. Comparing those values to their long-term averages makes them even more meaningful for each customer's unique context.

The Agronomic Values API, like its weather observations counterpart, by default supports up to 30 months of daily calculations and accumulations, making prior year comparisons simple. Additionally, our Long-Term Norms API for Agronomic Values allows you to calculate the averages (and standard deviations) for any of those values across any range of years for which we have data—up to 30 years depending on geography.

People often remember whether last year or the recent trend was good or bad. With increasing weather variability, climatological norms are losing their usefulness for daily decision-making. A 3-year, 5-year, or 7-year average can provide more relevant insight to understand how these more advanced attributes can lead to smarter decisions in the field.

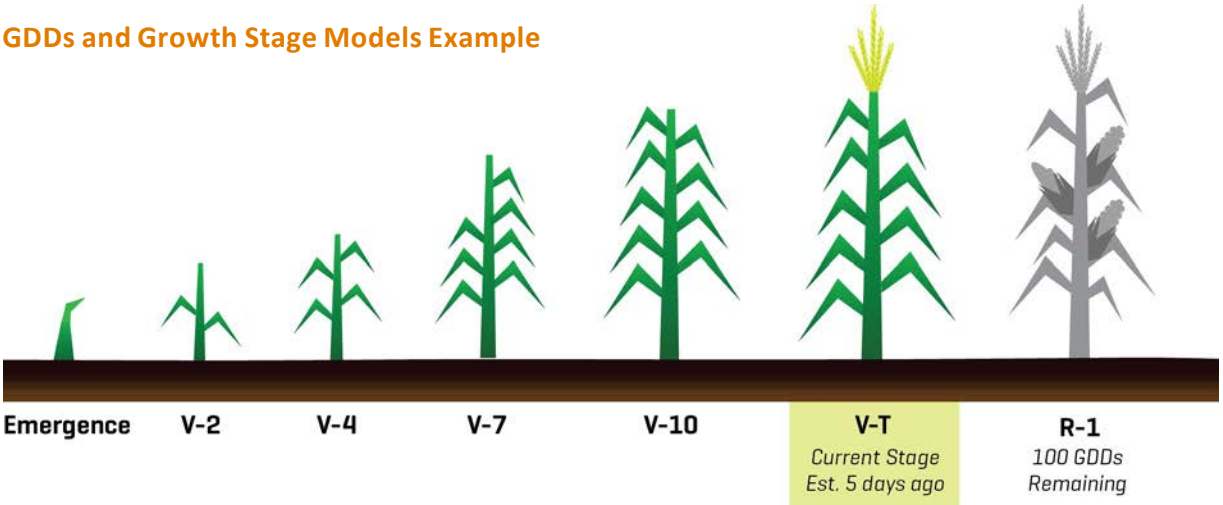
Agronomic Models help time decisions, so they'll be more effective

Enrich your app and help growers make the right decisions every day by building in powerful modeling capabilities. When your app can give better insight to what is happening on a field, farmers can better manage their day-to-day operations and week-to-week planning. aWhere's platform is designed to empower exactly this sort of agronomic modeling and decision-driving.

Today, aWhere offers a number of growth stage models that leverage accumulated GDDs to estimate the current phenological stage of a crop. Crops may only require certain activities or be susceptible to certain risks in a particular stage. Using the provided plant date and crop type, the API estimates when each past stage was reached, the current stage, and the GDDs remaining until the next stage; this can help tune when various inputs or mitigation efforts are required, reducing waste and improving ROI.

Whereas other providers may simply echo older published literature, our data and technology is supported by a team of agricultural and modeling scientists that vet or validate every model that is made available on our platform. In some cases, they have improved models' accuracy far beyond what's available in published literature. As we add models in the near future—from pests & diseases to moisture stress & aridity sensitivity—our customers can trust the efficacy of aWhere's data and science to drive better decisions in the field.

GDDs and Growth Stage Models Example



Using GDDs and/or the Growth Stage Models, your app can chart the history of a plant's development, or estimate when the next growth stage is likely to be seen.

aWhere Global Impact

Current Mobile-User Projects

Vodafone Farmers Club — **Ghana**

Users: 19,856

- Customers receive a text from Esoko at least once a week
- Users who recommended Esoko to at least one friend
- Users who agreed they experienced "positive changes in life"

Referrals: 91%
"Meaningfulness": 89%

Kenya

Users: 400,000
Drop Out Rate: .45%
New Requests: 500
Yield Increase: 50%
Change in Practice: 63%
Outputs Increase: 80%

- Weather helps plan planting, spraying, harvesting, and weeding.
- Farmers are **more likely to grow a new crop** when using this service.

India

Yield Increases: 30%

- Pilot crop sowing recommendation using machine learning
- Discussing expansion to additional Indian states and one African country

aWhere's Projected 2017 reach to Smallholder Farmers

Geography	Appoximate Farmers	
	As of September-16	*Projection-2017*
Latin America	160	1,500
East Africa	400,000	1,050,100
West Africa	20,000	100,200
Asia Pacific	230	36,000
Total	**420,390**	**1,187,800**

*North America: 120,000 farmers