



## **Insight for Land Stewardship**

How One Corn Grower Used Aerial  
Drone Imagery to Detect Drainage Issues  
Damaging the Land And Impacting Yield



PROCEED  
WITH  
CERTAINTY



"I'm a farmer who likes to try out a lot of new stuff. Especially with aerial analytics, there's no way I could lose yield, so I was willing to give it a try."

**MATT HEIDEMANN**  
CORN GROWER

## Putting Aerial Drone Data Analytics to Work

HOW ONE CORN GROWER USED AERIAL DRONE IMAGERY TO DETECT DRAINAGE ISSUES DAMAGING THE LAND AND IMPACTING YIELD.

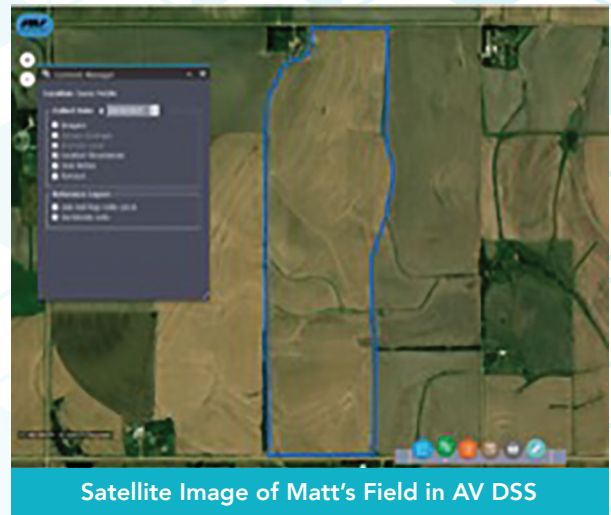
Agriculture has gone through a revolution since Matt Heidemann started farming his 2,800 acres in Nebraska in 1995.

Maximizing operational efficiency and reducing input costs continues to be a goal of virtually every farming operation. Innovative farmers like Matt Heidemann are continually testing new technology and techniques, such as aerial imagery and data analytics, to gain insights into their operation that will maximize production, while being good stewards of the land for generations to come. Matt uses an agronomist to help make informed business decisions, but he knew that by walking his fields they could only make spot observations within a limited sample size. Aerial imagery from satellites to drones held promise as a way to more efficiently, and objectively, scout his entire operation. But Matt also wondered if the superior image resolution of a drone over manned aircraft or satellite imagery would offer any additional tangible benefits. To answer this question, Matt worked with AeroVironment to survey his corn field, and process the aerial imagery data collected using the Quantix™ Hybrid Drone and AeroVironment Decision Support System™ (AV DSS) — a powerfully simple to use drone and data analytics ecosystem that delivers actionable field intelligence insights.



## METHODOLOGY

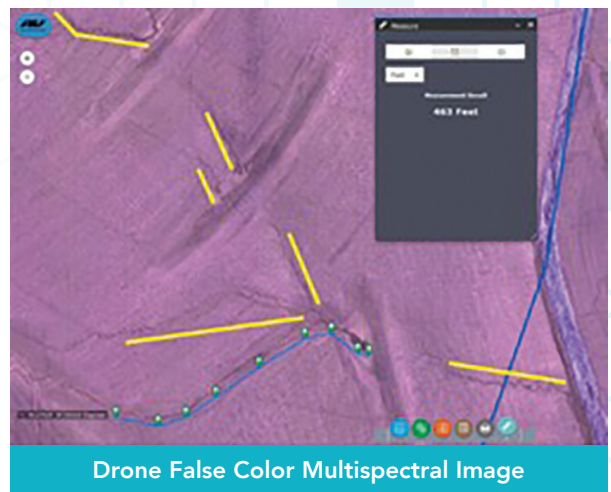
Matt and AeroVironment partnered for the 2017 growing season, collecting aerial imagery using several drone platforms in addition to Quantix, every 3 weeks from planting to harvest. To ensure like-for-like comparison, all imagery data was processed using the AeroVironment Decision Support System™ (AV DSS). Designed from the ground up for Precision Agriculture, AV DSS seamlessly processes aerial imagery, and performs data analytics to help growers detect anomalies in their fields that are not always visible from the ground or in the visible color spectrum. One of the key features of AV DSS is the ability for growers to perform historical and comparative analysis to help guide their decision making and improve operational efficiency. Quantix, a purpose designed drone solution, was able to collect high resolution imagery even in the challenging weather conditions of central Nebraska.



Satellite Image of Matt's Field in AV DSS

## OBSERVATIONS

Like many fields throughout the Midwest, Matt's corn field had a passive water management system of drain tiles and a terrace to help mitigate the damage of water run-off. After one of the drone flights, Matt was reviewing the data in AV DSS and one particular item caught his eye; there was evidence of water erosion in the field. Comparing it to an earlier flight before planting, Matt was able to identify several erosion lines not previously detected by walking the field. With the AV DSS Measure Tool (see right), he was able to quickly quantify the magnitude of the impact that was both robbing him of yield and nutrient rich top soil year after year. By analyzing his entire field, Matt found thousands of feet of erosion damage caused by combination of a damaged drain tile and an ineffective terrace system.



Drone False Color Multispectral Image

**"The streak you could see in the imagery, there's no way you're going to see that with your own eyes."**

## IMPLEMENTING CHANGE

While the drone aerial imagery and data analysis provided by AV DSS allowed Matt to identify and quantify the erosion and water management issues in his field, he still wondered if other aerial imaging solutions could have provided the same insights. To help Matt answer this question, AeroVironment's Geospatial Scientists resampled the Quantix drone NDVI imagery to resolutions matching those of manned aircraft and satellite systems.

QUANTIX & AV DSS  
NDVI



2 inch (5cm) Resolution

MANNED AIRCRAFT  
NDVI



8 inch (20cm) Resolution

SATELLITE  
NDVI



118 inch (3m) Resolution

What became clear to Matt was that aerial imagery with a resolution higher (worse) than 118 inches was not detailed enough to adequately identify these types of erosion issues. If Matt had simply relied on satellite imagery alone, this type of problem may have been missed. However, even with manned aircraft aerial imagery, if the data collect is not properly timed prior to vegetation growth, the issue could have been camouflaged, resulting in another year of reduced crop yield and loss of top soil. The on-demand timeliness, image resolution and analysis provided by the Quantix drone and AV DSS meant that Matt was able to get complete view of his field, and gain actionable intelligence.

## GETTING TO RESULTS

Even though Matt regularly walks his field and uses the support of an agronomist, drone aerial imagery data allowed him to efficiently gain an objective picture of his entire operation. Furthermore, AV DSS showed Matt that what you can see with the naked eye is not always a complete and accurate picture of crop or field health. With the Quantix drone and AV DSS ecosystem, Matt was able to experience first-hand the value of pairing high-resolution drone aerial imagery with advanced data analytics to spot anomalies and take corrective action, saving both the environment and his bottom line.



INSTANT  
INSIGHTS



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## ABOUT AEROVIRONMENT, INC. (AV)

AeroVironment (NASDAQ: AVAV) provides customers with more actionable intelligence so they can proceed with certainty. Based in California, AeroVironment is a global leader in unmanned aircraft systems, tactical missile systems and serves militaries, government agencies, businesses and consumers.

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