Choosing a Wireless Field Monitoring System

Seven Important Considerations

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Introduction

More and more, commercial growers are using in-field monitoring technologies to collect localized weather data for driving operational decisions. Likewise, researchers studying agriculture, climate, and ecological systems are increasingly looking for monitoring solutions to collect high-resolution environmental data over an area. With wireless field monitoring systems, growers and researchers can now monitor hyper-localized environmental conditions more effectively and more economically than is possible with traditional weather stations or stand-alone data loggers. Insights gained from such localized data are vital for better crop management, greenhouse management, and environmental research.

Overview of Wireless Field Monitoring Systems

Weather stations typically include a data logger with sensors connected by wires, limiting sensor deployments to the length of the cable that's mounted to a metal tripod. Wireless field monitoring systems, however, expand upon those station capabilities to include wireless sensors that are deployed over a wide area. As a result, wireless sensor networks provide continuous monitoring of field conditions over a much wider area of coverage than that of a stand-alone monitoring solution. Data is transmitted wirelessly from the network of sensors in the field to a central data gateway or station, and then to the web, eliminating the need to run cables that could interfere with operations.

Advantages of Wireless Field Monitoring Systems

For researchers, wireless field monitoring systems that provide more comprehensive data can be beneficial for gaining more insights and more definitive conclusions. The ability to monitor multiple points through a single weather station also means these scientists can spend less time on retrieving data and more time on the research.

Many high-value crops are sensitive to microclimate variations such as temperature, rainfall, and soil moisture, which directly affect quality and profitability. Growers of these types of crops can benefit from a wireless field monitoring solution that covers the critical areas in their fields, enabling them to be proactive and extra diligent in mitigating risks associated with insufficient water, excess heat, mildew, mold, and frost, all of which can impact crop yield.


Monitor a wide area with a wireless field monitoring system.

Due to cost and practical limitations, growers who use weather stations typically only have one or two units deployed in their fields, limiting their monitoring range to those one or two locations. This might be sufficient where field conditions are uniform, but in settings where conditions are variable, the ability to monitor a greater number of points throughout the growing area enables better-informed decisions that more accurately reflect the diversity of the environment. Wireless sensor networks allow growers to not only monitor multiple locations in their fields, but also to do it cost-effectively, because they can funnel data through a single web-enabled station.

With wired stand-alone data loggers, growers can also monitor many points in their fields. However, stand-alone loggers require the grower to manually download data, eliminating the ability for them to make decisions in real time, such as when responding to a frost alarm. Wireless sensors—which now cost about the same as data loggers—enable growers to receive data through the web, so they can conduct near real-time monitoring from anywhere and react quickly to protect their crops.

Addressing Commercial Agricultural Challenges

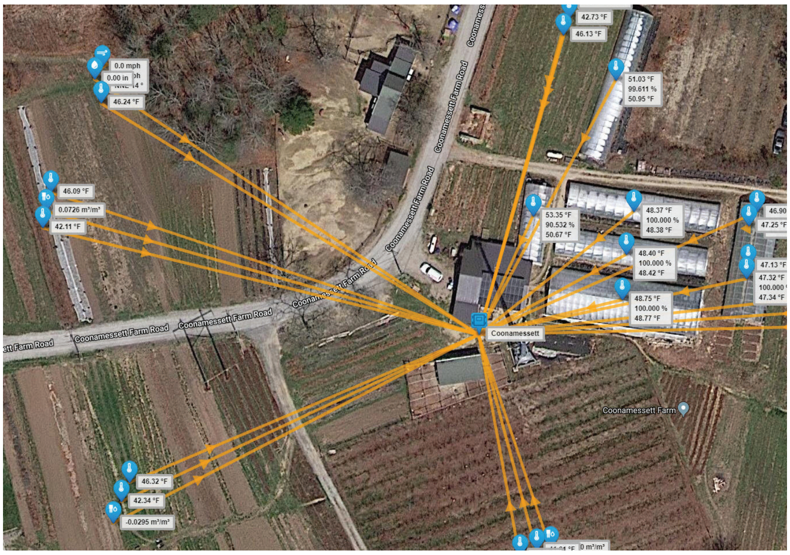
To increase the efficiency of agricultural operations and stay competitive, growers face pressure to minimize input costs and maximize yield. At the same time, water and pesticides—two of the highest input costs—are under greater scrutiny as governments and consumers place a higher priority on sustainability. Field monitoring systems can go a long way toward addressing these and other challenges.

Protecting Against Climate Hazards

In many areas, growers must deal with climate hazard risks such as frost or dry soil, which can impact yields. Frost is an especially serious concern that can potentially cause partial or total loss of crops.

Hills, valleys, and other variations in topography—which affect the amount of sun, shade, and wind exposure—can produce diverse microclimates across an agricultural landscape and greatly influence if and where frost will occur. For example, low points in a valley—where cold air will settle—create conditions that are more prone to frost formation. Valleys also tend to shelter against stronger winds, which is another factor that increases the risk of frost. Similarly, soil moisture can vary dramatically based on topology, soil type, and irrigation system variation.

These combined factors drive the need to monitor multiple locations to safeguard crops against both frost and dry soil. Wireless sensor networks, which monitor conditions across multiple points in agricultural fields, including areas where climate hazard risks are higher, can inform growers in real time where attention may be needed, enabling them to limit the use of frost protection systems to when and where high frost risks occur.



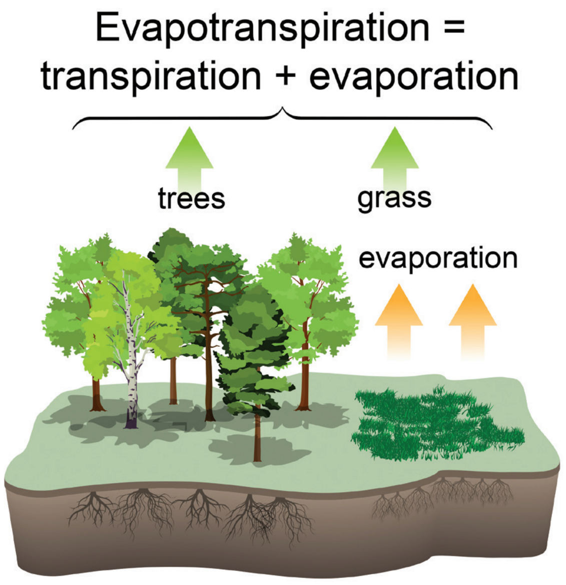
Look for a system that allows you to visualize conditions across diverse microclimates.

Reducing Water Use

Globally, water scarcity is a growing concern. With agriculture accounting for more than 70 percent of freshwater use in most regions of the world and approximately 80 percent in the United States, growers face increasing social and regulatory pressure to incorporate more efficient water-management practices.

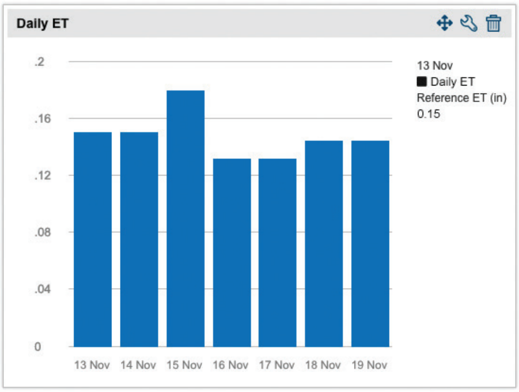
Another driver for minimizing water usage is the rising cost of water, including the energy costs associated with conveyance. Growers can't afford to risk cutting water use to a level that will impact their yields, however, and that's why it's increasingly important for them to optimize their irrigation methods.

Wireless sensor networks deployed across an agricultural operation can measure soil moisture or soil water potential to determine where irrigation should be applied and how much water should be used. By irrigating just the areas that need water, growers can cut usage and reduce operating costs without sacrificing crop yields.



Growers can also reduce water use by using evapotranspiration (ET) data to manage irrigation. Some wireless field monitoring systems provide reference ET, which can be multiplied by crop coefficients to determine crop water use. Growers only need to irrigate as needed to make up the difference between the rainfall received and the water used by crops.

Minimizing Pesticide and Fungicide Use



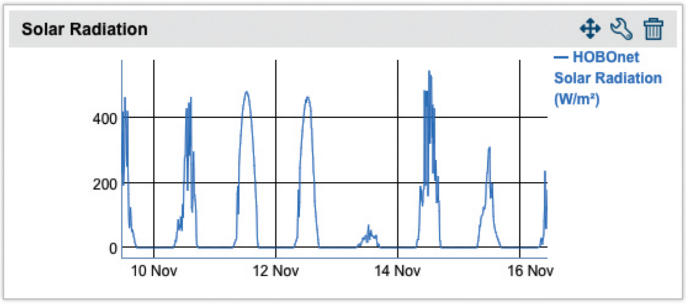
Pesticide and fungicide use represents one of the highest operational costs for growers. Applications can run as high as $100/acre per application, with some crops requiring multiple applications to prevent loss due to hazards such as mildew, mold, or insects.

The risk of disease and pests is a function of exposure to environmental factors such as temperature, humidity, and leaf wetness. By monitoring these conditions over time, growers can assess the probability of disease or pest emergence occurring in their crops and use these estimates to help optimize treatment applications—employing pesticides and fungicides only as needed to prevent outbreaks.

By using pesticides and fungicides only as needed, growers may be able to eliminate one or two applications per growing season, resulting in substantial savings. For example, by eliminating just one spraying per season, a typical 100-acre vineyard could save up to $10,000. Moreover, reduced spraying decreases the amount of pesticides and fungicides released into the air and soil, thereby improving sustainability.

Improving Harvest Timing and Crop Quality

The timing of a harvest is often critical to attaining the highest potential in crop quality and profitability. For vineyards in Portugal, as an example, the timing of grape harvests can make the difference in how the wine is rated, which in turn can dramatically influence the per-bottle-price that consumers are willing to pay. Portuguese vineyards are known to time their harvests based on the sugar content, pH, and feel of the grapes, in addition to the color of the leaves and climate conditions during ripening. For instance, rain before a harvest is not favorable, as moisture dilutes the sugar content, causing flavor loss. But while rain and temperature are the biggest drivers in harvest timing, solar radiation can also impact how the grapes ripen.



Solar radiation graph over 6 days.

Vineyards—and especially those with microclimate variations—can rely on wireless sensor networks to more thoroughly track rain, temperature, relative humidity, and light throughout different areas. As a result, owners will be able to gain a more accurate understanding of conditions throughout the entire vineyard, helping them to develop a better model for timing their harvests.

Key Factors to Consider with Wireless Field Monitoring Systems

To help you determine the best system for your needs and unique application requirements, here are seven important factors to consider when selecting a wireless field monitoring system:

1. Ease of Deployment
2. Wireless Sensor Coverage
3. Actionable Information
4. Alarm Notifications
5. Maintaining Complete Historical Data
6. Total Cost of Ownership
7. Scalability and Future Proofing

1. Ease of Deployment

When evaluating different wireless field monitoring systems, you should be mindful of the deployment process required with each option and prioritize solutions that minimize complexity.

To avoid difficulties with deployment, you can instead opt for a solution that provides simple, push-button configuration for adding sensors.

With some systems, the wireless nodes need to be programmed as part of the setup, requiring you to dedicate time to understand this process or seek outside help. Due to the deployment complexity of some systems, certain suppliers also offer installation services as a separate cost.

To avoid difficulties with deployment, you can instead opt for a solution that provides simple, push-button configuration for adding sensors. Moreover, nodes that come with sensors already connected are much faster to deploy, compared to those that require programming for each sensor connection. Wireless sensor networks that have an intuitive, user-friendly interface for mobile devices or laptops also make for a simpler configuration.

Look for smaller transmitters that have integrated solar panels for easy deployment.

For deploying wireless field monitoring systems, you should also consider:

• **Solar panel configuration.** Most wireless nodes use solar panels with rechargeable batteries. Sensor nodes that have built-in solar panels can be deployed faster than those that require you to connect and mount external panels.

• **Transmitter size.** Smaller transmitters can easily mount on a PVC pipe or a fence post. Larger transmitters may need a tripod, which can be a problem for deploying in some areas. When evaluating transmitter size, consider the environment where it will be deployed. The smaller the transmitter, the easier it is to mount, and the less likely it is to interfere with operations.

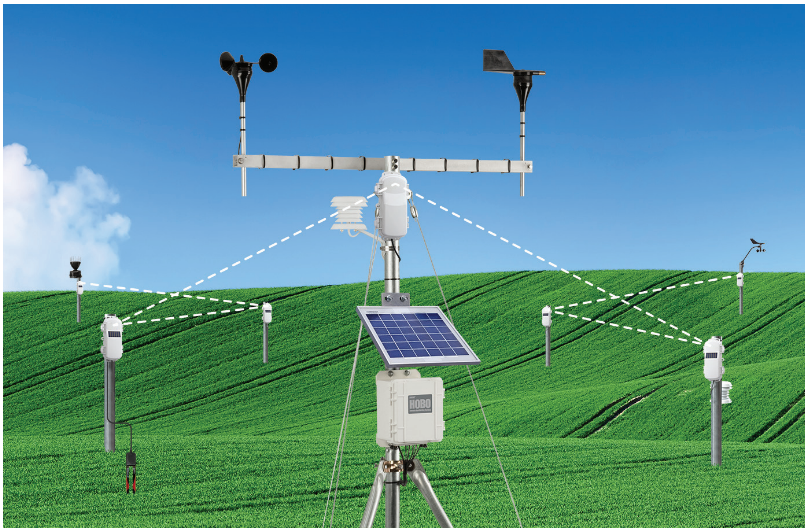
• **Mounting flexibility.** You should also consider how easily the transmitters can be mounted. A transmitter that can be attached with zip ties or a couple of screws will save time compared to one that requires bolts or U-bolts.

2. Wireless Sensor Coverage

When evaluating different wireless system options, carefully consider whether the system's wireless sensors will have the range to cover all the sites you need to monitor, as well as the reliability to ensure that you can view conditions and receive notifications during critical times.

Wireless frequency used. Compared to options that use 2.4 GHz, wireless sensors that use transmissions in the 900 MHz range for communication are better suited for transmitting through and around vegetation. Rain can also interfere with wireless communications (water attenuates wireless signal strength). Wireless signals in the 900 MHz range will be less attenuated than signals in the 2.4 GHz range.

Star vs. mesh network. While both types of networks use a web-enabled, central receiver to consolidate data from wireless nodes, with star networks all the nodes communicate directly to the central receiver. As such, the maximum range that can be monitored in any direction from a station is limited by the wireless range of the sensor.



Mesh networks allow "hops" to obtain a wider coverage area.

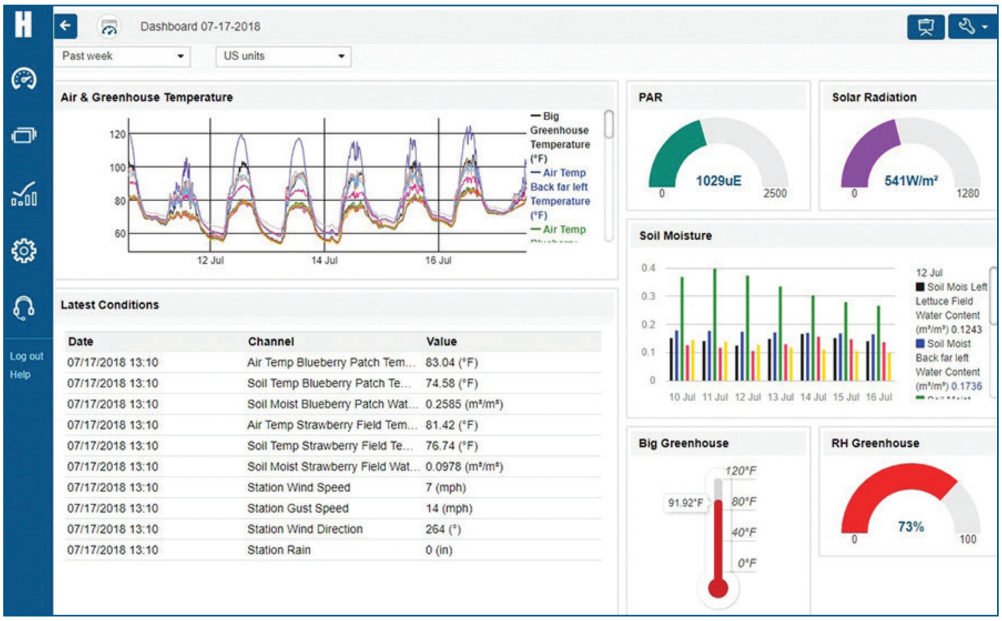
Mesh networks, on the other hand, have nodes that can relay signals from other nodes. These networks allow multiple "hops" (transmission step between two nodes, or from a node to a central receiver), so that you can obtain a wider coverage range. Also, repeater nodes can be added as needed for longer distances. Additionally, mesh networks offer a more robust wireless network by allowing signals—and the transmission of data—to take alternate paths back to the central station if a sensor goes offline, thereby providing redundancy and greater reliability. When looking at mesh networks, verify the number of hops back to the receiver that the system supports, as this will determine the maximum coverage range.

3. Actionable Information

More than receiving raw data, you need a solution that helps you make the best decisions. With this in mind, you should seek out a wireless field monitoring system that allows you to better visualize conditions across your monitoring area and provides actionable information that's clearly communicated in real time, through either:

• A map view, which shows current sensor readings on a map, or

• A dashboard view, which offers a customized look at the most critical parameters and can include visual gauges that show current values or graphs for viewing trends or recent historical data



Systems with a dashboard enable instant visualization of your data.

A well-designed dashboard, for example, would enable you to view your operation and understand where attention is needed, such as spots that are abnormally cold or dry. When considering systems, you should look for ones with dashboards that offer:

• Compatibility with the platforms you use in the office and the fields, including laptops, desktops, tablets, or smartphones

• Ability to integrate data from multiple stations and networks into views that clearly show the most critical information needed to make decisions

For agricultural use, you should also search for software that can leverage climate data to inform you when actions need to be taken, such as irrigating your crops or applying pesticides. Common software tools include:

• Evapotranspiration (ET): to determine crop water use to help decide when irrigation is needed; ET is also an important parameter for hydrological modeling and applications such as water resource management

• Growing degree days: to determine when plants or pests are reaching critical growth or development stages

• Crop disease models: to calculate the risk of disease or pest emergence and the optimal time to apply pesticides or fungicides

If the vendor's software doesn't have the ability to process data to the form that is required, you may be able to feed your sensor data into software available online to derive decision-making parameters. Examples include:

*Integrated pest management software from the Network for Environment and Weather Applications

**The DEGDAY Excel application from the University of California, Davis for calculating degree days

Researchers may want to visualize and work with data in a preferred platform. Consider the software's ability to easily export data in different file types. It may also be helpful if the software can automatically export data for use with third-party statistical tools.

** http://newa.cornell.edu/*
*** http://biomet.ucdavis.edu/DegreeDays/DegDay.htm*

4. Alarm Notifications

Consider a solution that can detect alarm conditions based on sensor readings or calculated parameters and provide notifications when conditions reach critical levels.

Look for a system that can provide real-time alarm notifications of critical conditions.

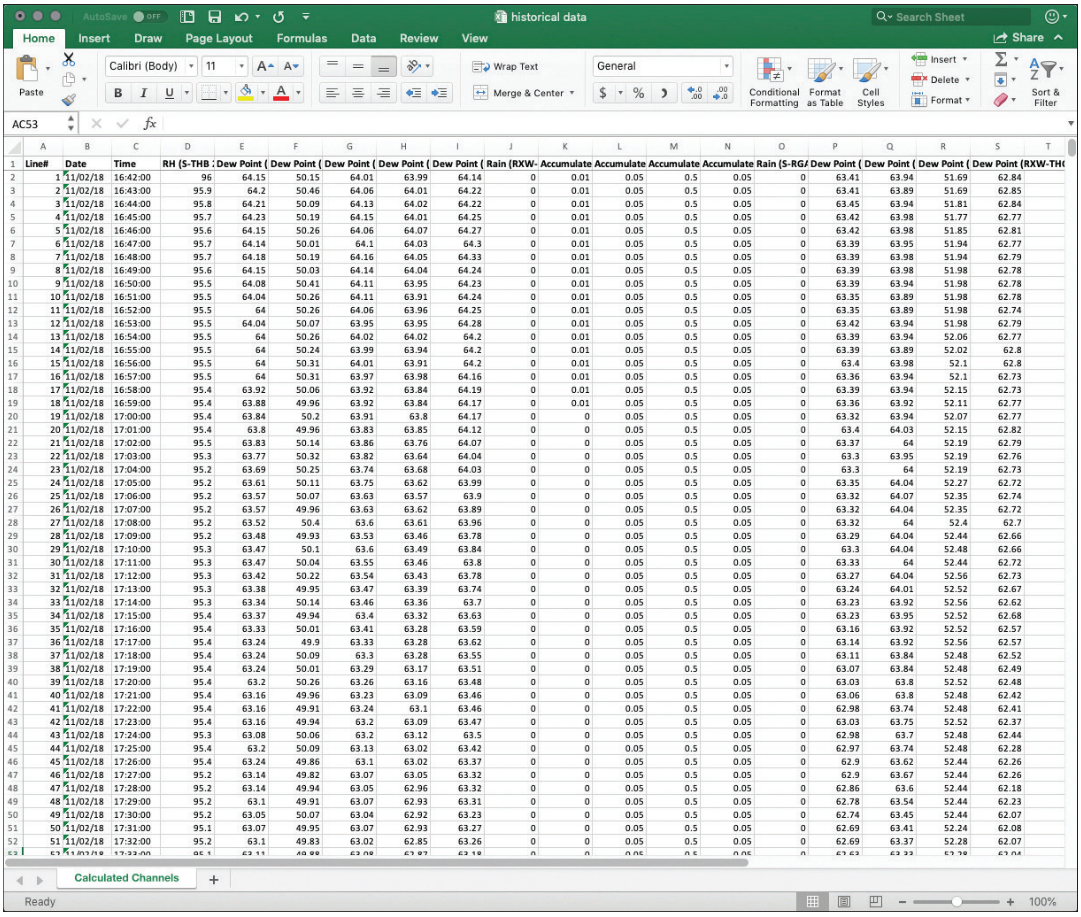
You should also think about where the alarm conditions are detected, because this influences the alarm response time. Systems that use web-based alarm detection require data to be uploaded to a website before readings are checked against alarm limits, which means the alarm response could take as long as the upload rate plus the maximum internet-latency time. A better option might be a system that checks alarm conditions from within the station and connects to the internet as soon as an out-of-limit condition is detected, instead of waiting for the next scheduled connection. As soon as the station connects, an alarm notification is sent automatically, typically as a text message or email.

Another aspect to consider is whether a system can also be set up to trigger a relay. For example, a system that sends a frost alarm when a low temperature threshold is reached would at the same time close a relay that turns on an irrigation system, spraying the crops to provide protection from freezing.

One further element to seek out with respect to alarm notifications is whether the system provides “hysteresis,” such that an alarm can be triggered on one level and be cleared at another level so that you don’t receive multiple alarms when conditions are near the alarm threshold. By allowing a system to be more tolerant of conditions that are hovering near the alarm threshold, hysteresis prevents alarms—and systems—from turning on and off repeatedly in a short amount of time.

5. Maintaining Complete Historical Data

If you are currently using or are exploring the use of historical data as part of your research project or growing operation, it is important to look for a system that ensures complete historical records by retaining data in the wireless nodes until upload is confirmed. In the event of a break in the wireless transmission, such a feature prevents data from being lost. Ideally the system will automatically upload the data from the nodes when wireless communication is restored, or worst case, the data can be offloaded directly from the nodes with a USB cable.



Line#	Date	Time	RH (S-THB :	Dew Point (	Dew Point (	Dew Point (	Dew Point (	Dew Point (	Rain (RXW-	Accumulate	Accumulate	Accumulate	Accumulate	Rain (S-RG/	Dew Point (	Dew Point (	Dew Point (	Dew Point (RXW-TH(
1	11/02/18	16:42:00	96	64.15	50.15	64.01	63.99	64.14	0	0.01	0.05	0.5	0.05	0	63.41	63.94	51.69	62.84
2	11/02/18	16:43:00	95.9	64.2	50.46	64.06	64.01	64.22	0	0.01	0.05	0.5	0.05	0	63.41	63.89	51.69	62.85
3	11/02/18	16:44:00	95.8	64.21	50.09	64.13	64.02	64.22	0	0.01	0.05	0.5	0.05	0	63.45	63.94	51.81	62.84
4	11/02/18	16:45:00	95.7	64.23	50.19	64.15	64.01	64.25	0	0.01	0.05	0.5	0.05	0	63.42	63.98	51.77	62.77
5	11/02/18	16:46:00	95.6	64.15	50.26	64.06	64.07	64.27	0	0.01	0.05	0.5	0.05	0	63.42	63.98	51.85	62.81
6	11/02/18	16:47:00	95.7	64.14	50.01	64.1	64.03	64.3	0	0.01	0.05	0.5	0.05	0	63.39	63.95	51.94	62.77
7	11/02/18	16:48:00	95.7	64.18	50.19	64.16	64.05	64.33	0	0.01	0.05	0.5	0.05	0	63.39	63.98	51.94	62.79
8	11/02/18	16:49:00	95.6	64.15	50.03	64.14	64.04	64.24	0	0.01	0.05	0.5	0.05	0	63.39	63.98	51.98	62.78
9	11/02/18	16:50:00	95.5	64.08	50.41	64.11	63.95	64.23	0	0.01	0.05	0.5	0.05	0	63.39	63.94	51.98	62.78
10	11/02/18	16:51:00	95.5	64.04	50.26	64.11	63.91	64.24	0	0.01	0.05	0.5	0.05	0	63.35	63.89	51.98	62.78
11	11/02/18	16:52:00	95.5	64	50.26	64.06	63.96	64.25	0	0.01	0.05	0.5	0.05	0	63.35	63.89	51.98	62.74
12	11/02/18	16:53:00	95.5	64.04	50.07	63.95	63.95	64.28	0	0.01	0.05	0.5	0.05	0	63.42	63.94	51.98	62.79
13	11/02/18	16:54:00	95.5	64	50.26	64.02	64.02	64.2	0	0.01	0.05	0.5	0.05	0	63.39	63.94	52.06	62.77
14	11/02/18	16:55:00	95.5	64	50.24	63.99	63.94	64.2	0	0.01	0.05	0.5	0.05	0	63.39	63.89	52.02	62.8
15	11/02/18	16:56:00	95.5	64	50.31	64.01	63.91	64.2	0	0.01	0.05	0.5	0.05	0	63.4	63.98	52.1	62.8
16	11/02/18	16:57:00	95.5	64	50.31	63.97	63.98	64.16	0	0.01	0.05	0.5	0.05	0	63.36	63.94	52.1	62.73
17	11/02/18	16:58:00	95.4	63.92	50.06	63.92	63.84	64.19	0	0.01	0.05	0.5	0.05	0	63.39	63.94	52.15	62.73
18	11/02/18	16:59:00	95.4	63.88	49.96	63.92	63.84	64.17	0	0.01	0.05	0.5	0.05	0	63.36	63.92	52.11	62.77
19	11/02/18	17:00:00	95.4	63.84	50.2	63.91	63.8	64.17	0	0	0.05	0.5	0.05	0	63.32	63.94	52.07	62.77
20	11/02/18	17:01:00	95.4	63.8	49.96	63.83	63.85	64.12	0	0	0.05	0.5	0.05	0	63.4	64.03	52.15	62.82
21	11/02/18	17:02:00	95.5	63.83	50.14	63.86	63.76	64.07	0	0	0.05	0.5	0.05	0	63.37	64	52.19	62.79
22	11/02/18	17:03:00	95.3	63.77	50.32	63.82	63.64	64.04	0	0	0.05	0.5	0.05	0	63.3	63.95	52.19	62.76
23	11/02/18	17:04:00	95.2	63.69	50.25	63.74	63.68	64.03	0	0	0.05	0.5	0.05	0	63.3	64	52.19	62.73
24	11/02/18	17:05:00	95.2	63.61	50.11	63.75	63.62	63.99	0	0	0.05	0.5	0.05	0	63.35	64.04	52.27	62.72
25	11/02/18	17:06:00	95.2	63.57	50.07	63.63	63.57	63.9	0	0	0.05	0.5	0.05	0	63.32	64.07	52.35	62.74
26	11/02/18	17:07:00	95.2	63.57	49.96	63.63	63.62	63.89	0	0	0.05	0.5	0.05	0	63.32	64.04	52.35	62.72
27	11/02/18	17:08:00	95.2	63.52	50.4	63.6	63.61	63.96	0	0	0.05	0.5	0.05	0	63.32	64	52.4	62.7
28	11/02/18	17:09:00	95.2	63.48	49.93	63.53	63.46	63.78	0	0	0.05	0.5	0.05	0	63.29	64.04	52.44	62.66
29	11/02/18	17:10:00	95.3	63.47	50.1	63.6	63.49	63.84	0	0	0.05	0.5	0.05	0	63.3	64.04	52.48	62.66
30	11/02/18	17:11:00	95.3	63.47	50.04	63.55	63.46	63.8	0	0	0.05	0.5	0.05	0	63.33	64	52.44	62.72
31	11/02/18	17:12:00	95.3	63.42	50.22	63.54	63.43	63.78	0	0	0.05	0.5	0.05	0	63.27	64.04	52.56	62.73
32	11/02/18	17:13:00	95.3	63.38	49.95	63.47	63.39	63.74	0	0	0.05	0.5	0.05	0	63.24	64.01	52.52	62.67
33	11/02/18	17:14:00	95.3	63.34	50.14	63.46	63.36	63.7	0	0	0.05	0.5	0.05	0	63.23	63.92	52.56	62.62
34	11/02/18	17:15:00	95.4	63.37	49.94	63.4	63.32	63.63	0	0	0.05	0.5	0.05	0	63.23	63.95	52.52	62.68
35	11/02/18	17:16:00	95.4	63.33	50.01	63.41	63.28	63.59	0	0	0.05	0.5	0.05	0	63.16	63.92	52.52	62.57
36	11/02/18	17:17:00	95.4	63.24	49.9	63.33	63.28	63.62	0	0	0.05	0.5	0.05	0	63.14	63.92	52.56	62.57
37	11/02/18	17:18:00	95.4	63.24	50.09	63.3	63.28	63.55	0	0	0.05	0.5	0.05	0	63.11	63.84	52.48	62.52
38	11/02/18	17:19:00	95.4	63.24	50.01	63.29	63.17	63.51	0	0	0.05	0.5	0.05	0	63.07	63.84	52.48	62.49
39	11/02/18	17:20:00	95.4	63.2	50.26	63.26	63.16	63.48	0	0	0.05	0.5	0.05	0	63.03	63.8	52.52	62.48
40	11/02/18	17:21:00	95.4	63.16	49.96	63.23	63.09	63.46	0	0	0.05	0.5	0.05	0	63.06	63.8	52.48	62.42
41	11/02/18	17:22:00	95.4	63.16	49.91	63.24	63.1	63.46	0	0	0.05	0.5	0.05	0	62.98	63.74	52.48	62.41
42	11/02/18	17:23:00	95.4	63.16	49.94	63.2	63.09	63.47	0	0	0.05	0.5	0.05	0	63.03	63.75	52.52	62.37
43	11/02/18	17:24:00	95.3	63.08	50.06	63.2	63.12	63.5	0	0	0.05	0.5	0.05	0	62.98	63.7	52.48	62.44
44	11/02/18	17:25:00	95.4	63.2	50.09	63.13	63.02	63.42	0	0	0.05	0.5	0.05	0	62.97	63.74	52.48	62.28
45	11/02/18	17:26:00	95.4	63.24	49.86	63.1	63.02	63.37	0	0	0.05	0.5	0.05	0	62.9	63.62	52.44	62.26
46	11/02/18	17:27:00	95.2	63.14	49.82	63.07	63.05	63.32	0	0	0.05	0.5	0.05	0	62.9	63.67	52.44	62.26
47	11/02/18	17:28:00	95.2	63.14	49.94	63.05	62.96	63.32	0	0	0.05	0.5	0.05	0	62.86	63.6	52.44	62.18
48	11/02/18	17:29:00	95.2	63.1	49.91	63.07	62.93	63.31	0	0	0.05	0.5	0.05	0	62.78	63.54	52.44	62.23
49	11/02/18	17:30:00	95.2	63.05	50.07	63.04	62.92	63.23	0	0	0.05	0.5	0.05	0	62.74	63.45	52.44	62.07
50	11/02/18	17:31:00	95.1	63.07	49.95	63.07	62.93	63.27	0	0	0.05	0.5	0.05	0	62.69	63.41	52.24	62.08
51	11/02/18	17:32:00	95.2	63.1	49.83	63.02	62.85	63.26	0	0	0.05	0.5	0.05	0	62.69	63.37	52.28	62.07

Historical data storage enables more informed analysis and planning.

For crop management, the availability of reliable historical data allows growers to analyze field climate conditions over time and identify longer-term trends and conditions that may be affecting their yields, enabling for more strategic planning. For example, long-term temperature data could help vineyard managers identify areas in their fields that are historically colder and where more tolerant grapes should be planted. Historical data can also demonstrate that a grower only sprayed when conditions were safe, minimizing the chance that pesticide could have drifted into a neighboring field.

6. Total Cost of Ownership

Be sure to consider all costs that might accrue over the lifetime of each wireless monitoring system you evaluate. These costs can include the purchase of a gateway station, wireless sensor nodes, data service plans, and mounting stands or poles.

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You should also consider costs associated with installation of the system, as well as annual maintenance. Complex systems are more expensive to install, and paying a little more upfront for a reliable, low-maintenance system can save you money in the long run. Importantly, if a system fails at a critical time, the potential cost of research data loss or crop damage/loss could be severe.

Whether the wireless system operates a star or mesh network can also have total cost of ownership implications. This can be especially true if you plan to expand in the future. For example, where a star network may force you to purchase a new station due to range limitations, a mesh network might allow you to simply add more nodes to expand coverage.

7. Scalability and Future Proofing

When selecting a field monitoring system, you will want to consider possible future needs. This may come in the form of monitoring additional microclimates, monitoring non-environmental factors such as energy usage or equipment runtime, or the desire to integrate new sensor types and technologies.

Consider the type of input options the system provides. For many applications, the manufacturer’s compliment of environmental sensors will cover all your needs. However, in other applications you may want to integrate sensors not available through the weather station manufacturer. In these cases, look for options that can integrate third-party sensors with different input types, such as analog or pulse inputs.

Conclusion

Your investment in a wireless field monitoring system can directly affect the quality of your research, or the profitability of your growing operation. Selecting the right system for your application is an important decision, so you'll also want to look for a provider that not only has qualified application specialists to help guide you through the process, but also offers long-term customer support.

About Onset

Onset is a leading supplier of data logger solutions for monitoring climate and crop conditions and improving both indoor and outdoor environments. Based on Cape Cod, Massachusetts, Onset has been designing and manufacturing its products on site since the company's founding in 1981.

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