METOS®

BY PESSL INSTRUMENTS

Product Portfolio

Software Solutions & Services

FEBRUARY 2025 EDITION

www.metos.global

Software & Services

Nested Approach to IoT Agriculture

Agriculture has changed dramatically in the last two decades and fast developing technologies will continue to have a tremendous influence on the farming practices in the years to come. IoT in agriculture is gaining importance since it helps monitor multiple on-farm assets at once. But how does it work?

The Nested or Holistic approach means connecting many different devices/solutions that are strategically placed in fields. Pessl Instruments connects all the dots, makes it easier to control your farm and fields, so you don't have to worry

about important management decisions being overlooked. This way you avoid unnecessary trips to the field, know exactly what the conditions at any given time are, make timely decision about irrigation, fertilizing, pesticide application, harvesting, and more 24/7 all year round.

For the nested approach to work, you need multiple devices to monitor multiple issues in your field and around your farm; having just one weather station cannot provide enough data to respond to everything your farm needs.

FieldClimate

| REMOTE FIELD & INSECT MONITORING | WORK TRACKING & WORKFORCE MANAGEMENT | LOCALISED WEATHER MONITORING & FORECAST | STORAGE & TANK MONITORING | FROST & STRESS WARNING | SATELLITE MONITORING | SOIL MOISTURE MONITORING | NUTRITION MANAGEMENT | CROP HEALTH MANAGEMENT & DECISION SUPPORT | VIRTUAL WEATHER STATION |

PESSL INSTRUMENTS SOLUTIONS

CropVIEW   *WorkTrack Tag*   *iMETOS 3.3*   *µMETOS*   *nMETOS / LoRATH*

iSCOUT & CropVIEW   **WorkTrack**   **FarmVIEW**   **Dualex / N-Pilot® 2.0**   **Disease models**   **METOS VWS**

METOS by Pessl Instruments -

The Revolution of Decision Making for Your Farm

No matter which crop, soil, or part of the world is in question, digital IoT agriculture solutions will reduce guess work and enable data driven decisions for:

- **improved quality of your yield**
- **enhanced productivity of your team and**
- **increased profit of your farm.**
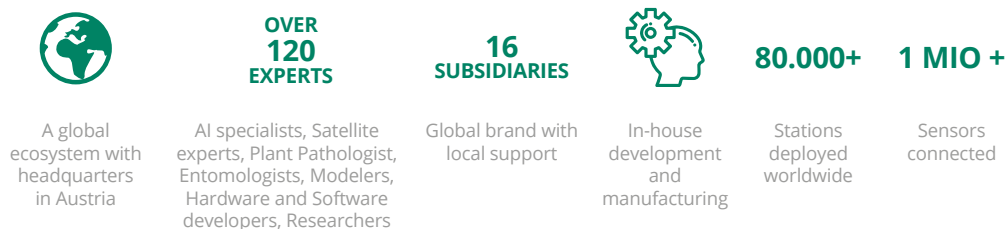
At the same time they will help:

- **optimize input use (water, energy, fertilizers, chemicals, and workforce),**
- **reduce the overall impact on the environment.**

Pessl Instruments has been serving growers, researchers and managers in 85 countries for more than 37 years. Customizable digital IoT agriculture hardware and software solutions cover all needs, pain points and challenges that boots on the ground face in their everyday work and we are proud to make the burden of decision making a bit lighter.

METOS IS APPLICABLE IN MULTIPLE SECTORS

AGRICULTURE **HYDROPONICS AND GREENHOUSES** **LANDSCAPE (GOLF AND TURF)** **SMART CITY** **ANIMAL WELFARE** **RESEARCH** **HYDROLOGY AND FLOOD WARNING** **METEOROLOGY**

PESSL INSTRUMENTS IN NUMBERS & FACTS

OVER 120 EXPERTS

16 SUBSIDIARIES

80.000+

1 MIO +

A global ecosystem with headquarters in Austria

AI specialists, Satellite experts, Plant Pathologist, Entomologists, Modelers, Hardware and Software developers, Researchers

Global brand with local support

In-house development and manufacturing

Stations deployed worldwide

Sensors connected

GLOBAL INTERFACE PARTNERS

LINDSAY · JOHN DEERE · meteoblue weather ☼ close to you · eesa · NEXT Farming · HORT@ · CLIMATE FIELDVIEW · LoRa · TALGIL Computing & Control Ltd. · DKE DATA · planet. · xarvio Digital Farming Solutions · Cropwise · LAT Nitrogen · Microsoft Azure · aws

API PARTNERS

BERMAD · SAP · SGS · aquagri · LACOS Precision in Software · 365FarmNet · HELENA · varda · WiseConn · Rivulis Irrigation · manna · Trimble · FASTERHOLT · IBF · BAUER FOR A GREEN WORLD · AgriMedic · CLIMATEMPO · a2a smart city · Crop Intelligence · AGRICOLUS · RWA · irriga GLOBAL · hispatec agrointelligence · DISAGRO · raindancer · AckerWetter.net · ZG Raiffeisen · RAIFFEISEN digITal GmbH · iXMAP · WINFIELD UNITED · MINFARMTECH · blugrape · DataFarm · PS Probe Schedule · AGRIVI · dropsight · Kwizda Agro · GLACIER farmmedia · JOANNEUM RESEARCH MATERIALS · STEP Systems GmbH · AGROBIZNES · AGRODAT

TELECOMMUNICATION PARTNERS

vodafone · HUAWEI · orange · IPKO · NOKIA · STARLINK · Telefónica

SENSOR PARTNERS

IRROMETER · Sentek · RIS · TOPCON · AquaCheck · spherag

INPUT INDUSTRY PARTNERS

YARA · syngenta · KWS · BASF We create chemistry · HZPC · ADAMA · Koppert · CORTEVA agriscience · Limagrain from earth to life · MAÏSADOUR · UPL OpenAg

Software & Services

FieldClimate Web & METOS Documentation

Our Mobile Applications

FieldClimate WEB

FieldClimate MOBILE APP

fieldclimate.com

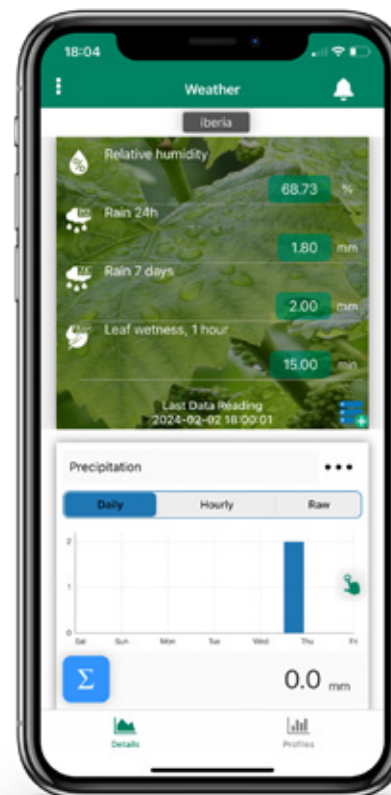### VISIT METOS.GLOBAL FOR EXTENSIVE METOS DOCUMENTATION

We are constantly updating and adding relevant content about disease models, weather forecast, irrigation management and other services, along with technical documentation and answers to frequently asked technical questions.

www.metos.global

FieldClimate web and mobile basic services are free of charge.

FieldClimate Overview

	BASIC SERVICES	SUBSCRIPTION			
	Included if you have access to a METOS device	METOS device Based	Data Package	Service Based	Cropzone Based (FarmView)
Stations and sensors data storage, visualization and settings management, Dashboard overview, Data based Notifications and SMS services, Accumulator tool, Extreme Temperature Monitoring page, Insect Monitoring and Detection iSCOUT page, CropVIEW Data-based notifications and page, Soil Moisture page, Sampling Data upload and visualization	✔				
METOS VWS - Virtual Weather Station (hardware METOS device is not necessary, a virtual one is generated)		✔			
Hybrid Station Extension (expand any physical METOS station with virtual sensors)		✔			
Weather Forecast - included: optional Work Planning and Animal Welfare Tools, integration with Extreme Temperature page (Frost and Heat waves monitoring)		✔			
Pest & Disease Models		✔			
Insect monitoring and detection via iSCOUT Mobile app (digitalize manual traps, iSCOUT or other METOS device is not strictly necessary)			✔		
Work Tracking				✔	
Satellite Page (METOS device is not necessary)					✔
Yield Prediction					✔
Irrimet Water Balance					✔
FarmView Soil Moisture sum module & widget					✔

METOS VWS -
Virtual Weather Station

🌐 https://metos.global/imetos-vws/

Order number: 800005

Virtual Stations exist for any point on the earth, for which meteoblue can derive weather data. The data is not the result from an actual METOS station measurement, but consists of simulated data, calculated by highly reliable meteoblue weather models.

In some terrains, such as flatlands, the calculated data is highly accurate with minimal discrepancies to actual values, such as temperature or precipitation. These are the regions where virtual stations prove to be a great asset.

In cases where terrain is more complex or discrepancies from the actual values, we recommend installing a METOS station.

DATA QUALITY

Air temperature	👍
Relative humidity	👍
Solar radiation	👍
Wind speed	👍
Precipitation	👎
Leaf wetness	👎
Soil temperature	👎

With actual case studies, METOS VWS is under continuous improvements.

VIEW RESULTS ON OUR WEBSITE:

MAIN FEATURES

Calculated sensor variables equal to iMETOS IMT300 sensor set: wind speed, solar radiation, soil temperature, air temperature, precipitation, relative humidity and leaf wetness, along with calculated values of ETo, vapor-pressure deficit (VPD) and Delta T. All data and decision support services are accessible online through FieldClimate platform.

METOS VWS vs METOS IoT STATION

	Virtual station	METOS IoT Stations
Variables	Same parameters as iMETOS IMT300 + soil temperature	Based on sensor set
Precision	Limited	High
Availability	Anywhere in the world	Only where the station is installed
Terrain	Not complex terrain	Any terrain
Maintenance	No maintenance	Regular hardware maintenance necessary
Suitability for high value decisions (frost, water management etc.)	Limited	High

THE ADVANTAGES

A perfect entry into precision agriculture with no maintenance cost
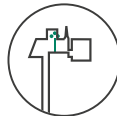
Offers the same range of solutions as an actual weather station

Very cost effective, simple to use and activated with just a few clicks on the computer or phone

Works as a complete decision support service - provides weather forecast, offers disease models and helps with work planning

Hybrid Station Extension (HSE)

🌐 https://metos.global/hybrid-station/

You can make your physical METOS station a "Hybrid" by extending it with virtual sensors (METOS VWS full set available). The service is available via yearly subscription. The virtual sensors will be added to the chart and table, together with the physical sensors, but properly differentiated. The possible sensors to be added are:

- Air temperature (virtual)
- Relative humidity (virtual)
- Leaf wetness (virtual)
- Precipitation (virtual)
- Wind speed avg (virtual)
- Wind speed gust (virtual)
- Wind direction (virtual)
- Global solar radiation (virtual)
- Soil temperature (virtual)

WHERE VIRTUAL DATA COMES FROM?

- Virtual sensor data quality is the same as our other product METOS VWS (Virtual Weather Station) and comes from the best available weather simulation for the specific location.
- Various weather models are incorporated, which in turn are calculated from data measured by weather stations, observation data from satellites, and a number of other data sources.
- For locations with a nearby weather station, the station's data are automatically used to further improve the quality.
- The precipitation virtual data is updated using radar data (if available) and satellite data is used to update the data for cloud cover and global solar radiation.

KEY FEATURES

- Hybrid station is the perfect solution to expand any physical METOS station at low price.
- Get access to advanced tools like Disease models, ETo.
- Virtual sensors are shown together with the physical sensors, but differentiated.

Weather Forecast

HYPER-LOCAL STATION-CORRECTED WEATHER FORECAST

With METOS weather station, you get the best forecast for your farm and fields by: using real-time local measurements to post-correct modeled forecast output, eliminating model bias and updating the forecast frequently with the last data from your station, satellite and radar. Artificial intelligence is further used to increase the models skill and optimally combine/select the best forecast models at any particular location.

meteoblue weather model
Weather forecast is provided by meteoblue

+

METOS station
Observation data are collected by each station

=

FieldClimate platform
Site-specific weather forecast
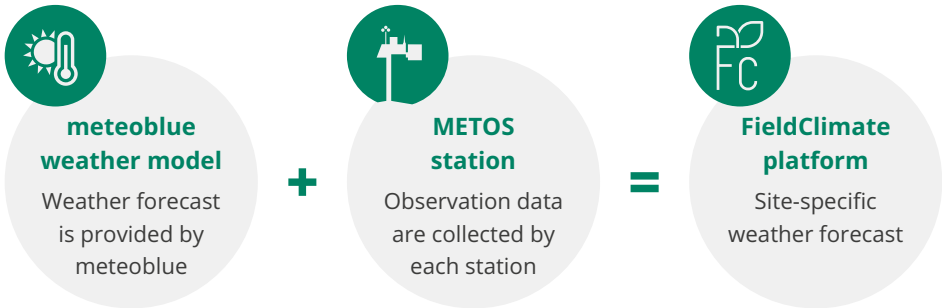
WHAT YOU GET

- Highly precise weather forecast specific for your field
- Ensemble approach using different weather models achieving high precision and forecast is corrected with station measurements
- Detailed view 3 or 7 days forecast on an hourly basis
- 14 days forecast with daily resolution showing the possible weather developments
- Output data for all major agrometeorological variables
- Friendly graphic meteograms available

To activate an accurate weather forecast and receive meaningful benefits, at least an air temperature sensor is required. Air temperature data is essential as it is used to calculate other key variables such as relative humidity and dewpoint, providing a more comprehensive and precise forecast. While air temperature alone is sufficient for these calculations, adding additional sensors may further enhance forecast accuracy.

Global Weather Maps & Radar
REAL-TIME MONITORING, NOWCASTING AND FORECAST

Within our Weather Forecast offer, we provide unique features and dynamic weather maps centered on your station, providing a spatial overlook, from satellite and radar real-time information, and forecasts for extreme temperature, temperature and a wind animation, reaching out to 7 days ahead. You can even choose between different weather models and add different layers.

Satellite & Radar animation shows the cloud cover and precipitation worldwide in almost real-time, going back 24 hours in the past.

Weather radar includes a high-resolution 1-hour and 2-hours forecast, respectively. Thanks to the real-time map animation, we can see in which direction the precipitation is moving, whether it is attenuating or intensifying (lightning, hail, showers).

Clouds & Precipitation, Air temperature maps show a 7-days forecast, with 3-hours step interval.
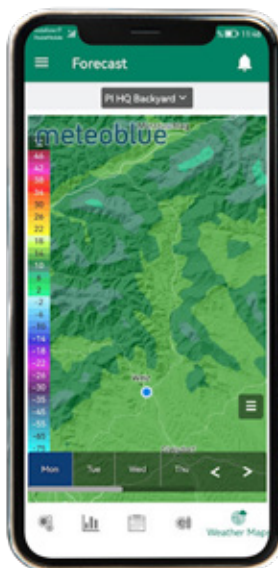
Weather warnings provided by the respective National Hydro-Meteorological Service (NHMS).
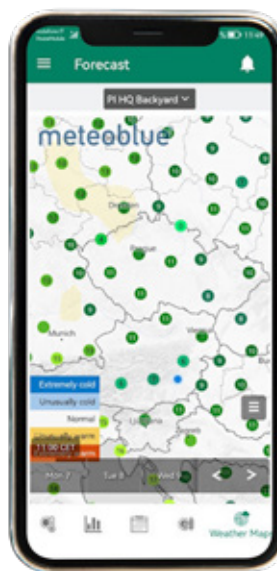
Forecasts for extreme temperatures. The weather anomaly is shown when the weather forecast is unusually warm or cold. The comparison is based on 40 years of historic weather data from our unique simulation models.

Wind animations are the most visually appealing and entertaining maps: streamlines and colours indicate the movement of entire air masses.
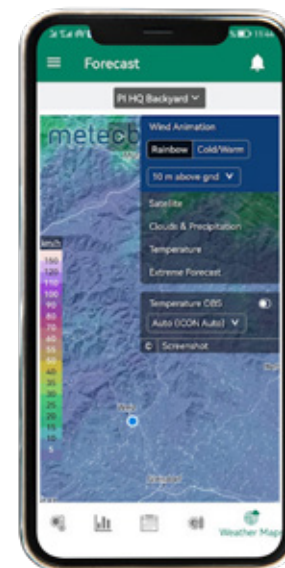
Station-Specific History & Climate

This newly launched section provides diagrams based on more than 35 years of hourly weather model simulations. They give good indications of typical climate patterns and expected risk conditions. By comparing different years, you can reveal patterns of specific events. These diagrams assist in weather dependent decisions such as sowing periods, outdoor activities or vacation planning.

ASSESS THE RISK OF FROST, HEAVY RAINFALL, DROUGHT ON YOUR FIELD BASED ON THE LAST 35 YEARS

The risk assessment diagram displays the probability of a specific weather event or risk to occur during a year. For cold or warm events, precipitation or water capacity, the results are intuitive graphics that show the distribution of the expected risk throughout the year and the appearances of the risk events since 1986.
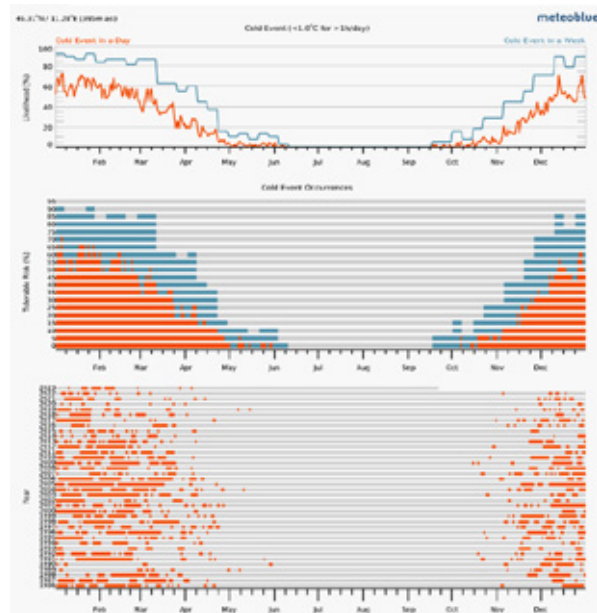
SHOWS HOW "NORMAL" THE WEATHER IS

The following meteogram (top) compares the weather variables (air temperature and precipitation) for the current season (last 12 months) with the 30-year mean climate. Another meteogram is available (bottom), showing the expected weather for the next 6 days, comparing the weather of the previous 10 or more years.
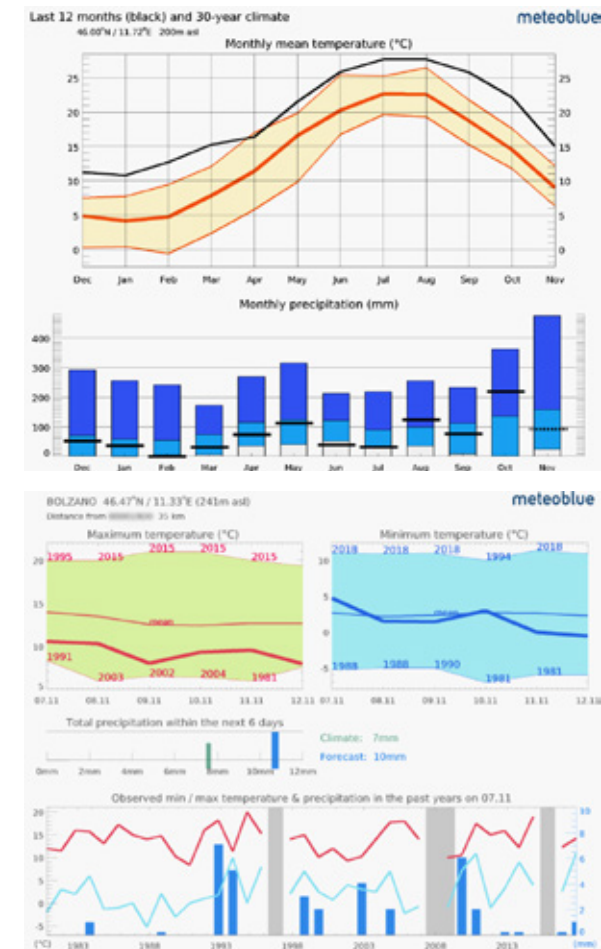
Extreme Temperature Monitoring & Forecasting

The Extreme temperature page is dedicated to **Frost Events or Heat Waves monitoring applications**, with station measured data and predictive 48h of key frost parameters. Protect from frost and heat waves keeping an eye over measured and forecast data on the same chart, allowing a quick assessment of the current situation, to identify risks and prevent damage to the crops and to the health of the population. The chart includes by default:

- 48h+ past measured data of air temperature, wet & dry bulb temperature.
- 48h hyper localized forecast of air temperature and wet bulb temperature updated frequently with the latest data from your station, satellite and radar.

Warning horizontal lines are shown on the chart, once you have set the thresholds specific to your needs under Settings -> SMS Warnings/Notifications: blue line (Warning SMS) and green line (Notification).

REAL-TIME FROST ALERTS

Receive alerts by SMS, email or app notifications of the wet bulb or any other sensor connected to the frost station. This way you will know the exact moment in which crops are at risk and this will help you save money.

You can set Notifications on the web interface or directly in the mobile app.
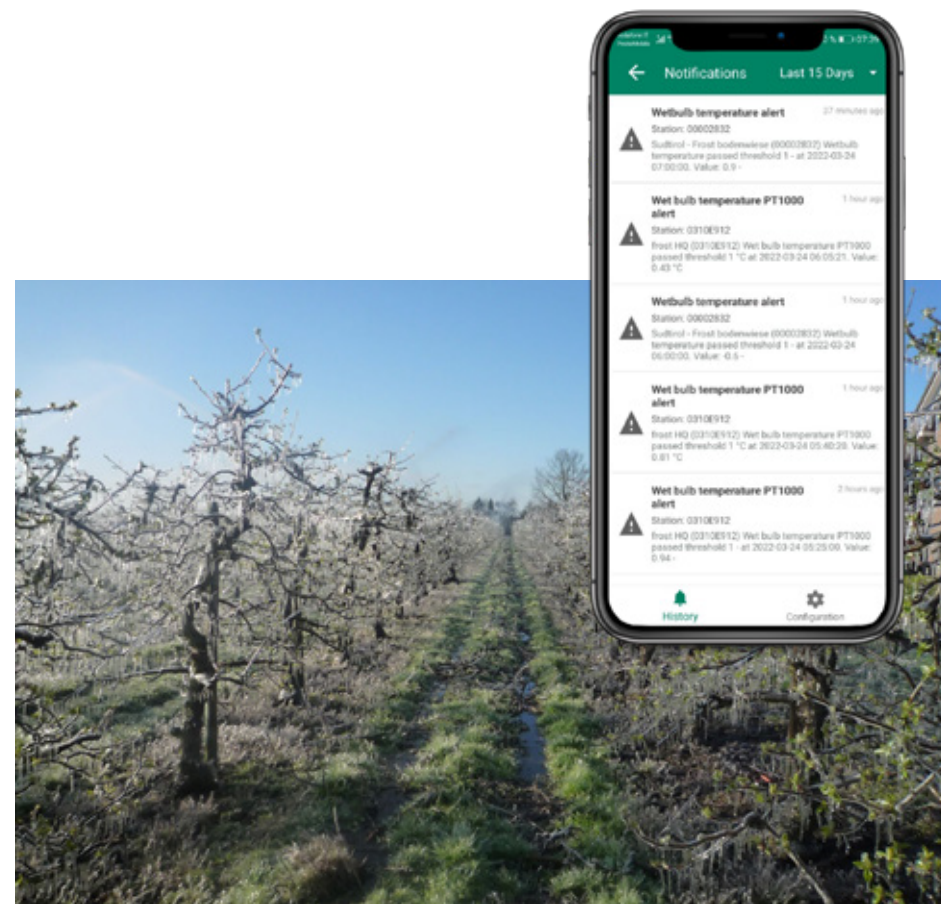
Work Planning Tools

SAVE TIME, INCREASE YOUR YIELDS

Site-specific weather forecast based service, hourly updated, color coded actions including the following services:

- Plant nutrition
- Field accessibility
- Tillage ability
- Spraying window
- Sowing window specific for potato, sugarbeet, canola, sunflower, cotton and general crops. On request option available for tropical climate
- Harvesting window for fruit and grape, sugarbeet and potato, small cereals, hail and silage preparation

BENEFITS:

- Plan the work week based on a localized weather forecast for your operations site
- Better organize your work day based on the actual rain and temperature data and the hourly updated weather forecast for your field
- Plan your fertilization application with accurate hourly weather forecasts
- Know the best hours to access your fields for the next several days based on soil tractability
- Optimize crop treatments based on site-specific spraying window
- Know when to plant and sow your crop considering adequate availability of precipitation, optimal temperature and more weather conditions
- Harvest your crop only when conditions are optimal
- Maximize your yield and quality with optimized weather risk forecasts of your fields

Disease Models

Station » Measurements » FieldClimate » Disease Models

A plant disease model is a mathematical description of interactions among the environment, the host plant and the variables related to the pathogen that can lead to the development of the disease. The more advanced models are those which can predict the impact or severity of the disease and the development of inoculum.

Pessl Instruments models have been developed to provide the best information possible to enable conscious decision making and use the best tools to produce more, both in terms of quantity and quality.

The majority are a result of international scientific cooperation with research institutes and universities over the last 30 years. Having been used by farmers for several years in different climates and environments, they have proven their efficiency over time.

PESSL INSTRUMENTS HAS MORE THAN 80 DISEASE MODELS FOR MORE THAN 35 CROPS, WHICH CAN BE ACCESSED DIRECTLY THROUGH THE www.fieldclimate.com PLATFORM.

Knowing only the timeframe in which disease pressure increases is only half the battle. Precise information on the weather is needed prior to the scheduling of well-timed phytosanitary interventions. To make the most out of our Disease Models, we recommend using them in combination with our **Spray Window tool**.

Assess the risk of Disease occurrence and pressure together with an optimal time frame for spraying in order to make a data-based and informed decision on spray timing. In this way our clients can minimize the risk of misusing and wasting plant protection products while at the same time protecting the environment.

The spray window helps identify suitable periods for the application of crop protection measures by showing suitable (green), less suitable (yellow) and unsuitable (red) periods for application. The conditions are calculated from wind, precipitation, air temperature, relative humidity and delta T.

Spray window
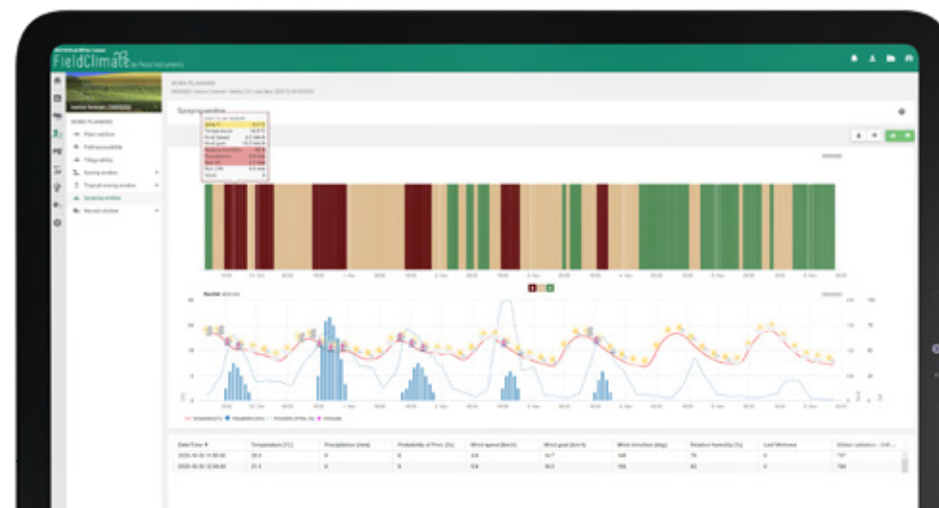
DISEASE MODELS FOR VITICULTURE

- **Downy mildew** (*Plasmopara viticola*) - Primary infection according to Cortesi, Hill et al.; secondary infection according to Arens, Blaser and Gehman; incubation period time according to Mueller and Sleumer)
- **Powdery mildew** (Powdery mildew risk according to Gubler and Thomas and powdery mildew risk modified to take into account the effects of *A. quisqualis*)
- **Grey mould**
- **Black rot**
- **Anthracnose**
- **Leaf growth** and **rainfall accumulation**
- **Fungicide wash off**
- **Grape berry moth**
- **Phomopsis leaf spot**

Information management in the vineyard is of key importance for the decision-making process. It leads to the production of high quality grapes and is the starting point of the production of fine wines.

We have been helping grape producers and wine experts in the management of their crop for more than 25 years, and were pioneers in producing weather stations capable of calculating disease models for downy mildew of the vine.

The models have been validated through the years of use in the wide range of wine-growing areas.

METOS stations provide the raw data (rainfall, leaf wetness, temperature and humidity) that are used in the mathematical calculation of disease models. They are available through the fieldclimate.com platform - for the main plant diseases and insects.
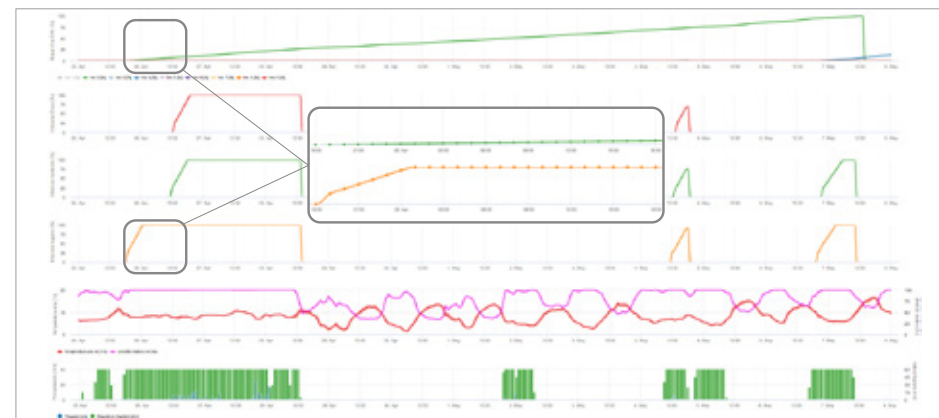
In the graph you can see how a period with rainfall, long intervals of leaf wetness and high relative humidity combined with air temperature is followed by the development of a primary infection of peronospora. When the infection reaches 100%, the model begins to calculate the incubation period for this infection. When 100% incubation is reached, symptoms are visible on leaves (oil spots).

STATIONS & SENSORS

Basic sensor set needed for pest and disease monitoring: air temperature and relative humidity, rain gauge and leaf wetness. In some cases solar radiation, soil temperature and soil moisture sensors are also necessary. You can have these sensors on some variants of µMETOS and iMETOS 3.3, and on nMETOS 200.
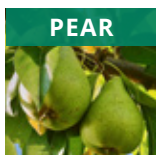

Through API, the data from METOS stations can be used on web platforms to provide plant disease models and DSS for plant protection.

OTHER DISEASE MODELS
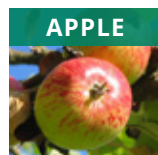
APPLE
- Apple scab (*Venturia inaequalis*)
- Apple Codling moth (*Cydia pomonella*)
- Apple Aphids (*Aphis pomi*, *Dysaphis plantaginea*)
- Stroke of fire blight (*Erwinia amylovora*)

PEAR
- Pear scab (*Venturia pyrina*)
- Brown spot of pear (*Stemphylium vesicarium*)
- Stroke of fire blight (*Erwinia amylovora*)
- Aphid risk
- *Fabraea* leaf spot

STRAWBERRY
- Grey mould (*Botrytis cinerea*)
- Powdery mildew (*Podosphaera aphanis*)
- Leather berry (*Phytophthora cactorum*)
- Chilling portions

BLUEBERRY
- Ripe rot (*Colletotrichum acutatum*)
- Anthracnose (*Elsinoë veneta*)

CHERRY
- Blossom blight (*Monilia laxa*)
- Coryneum Blight (*Wilsonmyces carpophilus*)
- *Cladosporium carpophilum* risk
- Powdery mildew risk
- *Taphrina* leaf curl
- Leaf spot (*Blumeriella jaapii*)
- Western flower thrips (*Frankliniella occidentalis*)
- Bacterial cancer (*Pseudomonas syringae*)

CITRUS
- Alternaria rot (*Alternaria alternata*)
- *Colletotrichum acutatum*

TOMATO IN OPEN FIELD
- Late Blight (*Phytophthora infestans*)
- *Alternaria alternaria* (TomCast model)
- Root rot (*Phytophthora capsici*)
- Powdery Mildew (*Leveillula taurica*)
- Grey mould (*Botrytis cinerea*)
- Fruit rot
- Powdery mildew risk

TOMATO IN PROTECTED FIELD
- Grey mould (*Botrytis cinerea*)
- Leaf spot (*Septoria lycopersici*)
- Anthracnose (*Colletotrichum coccodes*)
- Leaf mould (*Cladosporium fulvum*)
- Powdery mildew risk
- Alternaria Early blight (*Alternaria solani*)
- Aphid Risk

APRICOT, PRUNE & MIRABELLE
- Pocket or bladder Plum gall (*Taphrina pruni*)
- Aphid risk
- *Xanthomonas arboricola* infection
- *Monilinia* risk
- Shot hole wilsonomyes carpophilus
- Powdery mildew risk
- *Taphrina* leaf curl
- Scab / cladosporium carpophilum
- Brown rot (*Monilia laxa*)
- Rust infection

PEACH
- Peach leaf curl (*Taphrina deformans*)
- Peach Scab (*Cladosporium carpophilum*)
- Aphid risk
- *Monilia* risk
- Powdery mildew
- *Sphaerotheca pannosa* risk

MELON & WATERMELON, CUCUMBER, ZUCCHINI & PUMPKIN
- Downy Mildew (*Phytophthora infestans*)
- *Alternaria*
- Powdery Mildew
- Grey mould risk

PEPPER & EGGPLANT
- *Alternaria alternaria* (TomCast model)
- Root rot (*Phytophthora capsici*)
- Grey mould (*Botrytis cinerea*)

OLIVE
- Olive scab (*Spilocea oleagina*)
- Anthracnose

NUTS
- Walnut antrachnose (*Gnomonia leptostyla*)
- Walnut blight (*Xanthomonas arboricola pv. Juglandis*)
- Panicle and shoot blight
- Rust infection

ONION
- Downy Mildew (Milioncast model for *Peronospora destructor*)
- Botrytis leaf blight (*Botrytis squamosa*)
- Grey mould (*Botrytis cinerea*)
- Leaf blight (*Stemphylium vesicarium*)
- Purple blotch (*Alternaria porri*)

LETTUCE
- Downy Mildew (*Bremia lactucae*)
- Grey mould (*Botrytis cinerea*)
- Anthracnose (*Microdochium panattonianum*)

CARROT & BEET

- Carrot leaf blight (*Alternaria dauci*)
- Sugarbeet leaf spot (*Cercospora beticola*)

ASPARAGUS

- Purple spot (TomCast model and infection model for *Stemphylium vesicarium*)
- *Botrytis* (*B. cinerea*)
- Asparagus rust (*Puccinia asparagus*)

RICE

- Rice blast (*Magnaporthe grisea*)
- Sheath blight (*Rhizoctonia solani*)

CORN

- Corn leaf blight (*Helminthosporium, Bipolaris*)
- Ear rot (*Fusarium sp.*)

WHEAT

- Wheat Rusts (*P. graminis, P. tritici, P. striiformis*)
- *Fusarium* head blight (with mycotoxin alert)
- Septoria diseases
- *Pyricularia grisea*
- Anthracnose
- Aphid risk
- Powdery mildew (*Blumeria graminis*)

POTATO

- Potato light blight (*Phytophthora infestans*) - Prediction of risky periods for infection and NoBlight model to define further application intervals
- *Alternaria solani* (TomCast model)
- Potato black leg (Pectobacterium aerial infection)
- Potato black leg (Pectobacterium soil infection)
- Colorado beetle
- Aphid risk

For more information visit: metos.global/disease-models

Crop Models - Sensors Required

CROP	SENSORS REQUIRED ▶	RAIN	AIR TEMPERATURE	RELATIVE HUMIDITY	LEAF WETNESS	SOIL TEMPERATURE	SOIL WATER TENSION	SOIL WATER CONTENT (VWC)	ETo EVAPOTRANSPIRATION	SOLAR RADIATION
Almonds		X	X	X	X					
Apples		X	X	X	X					
Apricots		X	X	X	X					
Asparagus		X	X	X	X					
Avocados		X	X	X	X					
Bananas		X	X	X	X				X	
Barley		X	X	X	X	X				X
Bean		X	X	X	X	X				
Beetroot			X	X	X					
Blackberries		X	X	X	X	X				X
Blueberries		X	X	X	X					
Cabbages		X	X	X	X	X				X
Carrots			X	X	X					
Cauliflower and broccoli		X	X	X	X	X				X
Cherries		X	X	X	X		X			
Coffee		X	X	X	X					
Cotton		X	X	X	X					X
Cucumbers		X	X	X	X					X
Eggplants		X	X	X	X					
Elderberry		X	X	X	X					
Flax		X	X	X	X	X				X
Grapes		X	X	X	X					
Hazelnuts		X	X		X					
Hemp		X	X	X	X	X				X

CROP	SENSORS REQUIRED ▶	RAIN	AIR TEMPERATURE	RELATIVE HUMIDITY	LEAF WETNESS	SOIL TEMPERATURE	SOIL WATER TENSION	SOIL WATER CONTENT (VWC)	ETo EVAPOTRANSPIRATION	SOLAR RADIATION
Kiwi fruit			x	x	x					
Lemons		x	x		x					
Lentils		x	x	x	x	x				
Lettuce		x	x	x	x					
Macadamia		x	x	x	x					
Maize		x	x	x	x					
Mangoes		x	x	x	x					
Olives		x	x	x	x					
Onions		x	x	x	x					
Oranges		x	x	x	x					
Peaches or Nectarines		x	x	x	x					
Pears		x	x	x	x					
Peas		x	x	x	x	x				
Pistachios		x	x	x	x					
Plums and Sloes		x	x	x	x					
Pomegranate		x	x	x	x					
Potatoes		x	x	x	x	x		x		x
Pumpkin		x	x	x	x					x
Quinces		x	x	x	x					
Rapeseed		x	x	x	x	x				
Raspberries		x	x	x	x					
Rice		x	x		x					x
Soya beans		x	x	x	x	x				x
Strawberries		x	x	x	x					

CROP	SENSORS REQUIRED ▶	RAIN	AIR TEMPERATURE	RELATIVE HUMIDITY	LEAF WETNESS	SOIL TEMPERATURE	SOIL WATER TENSION	SOIL WATER CONTENT (VWC)	ETo EVAPOTRANSPIRATION	SOLAR RADIATION
Sugar beet		x	x	x	x					
Sugar cane		x	x	x	x					
Sunflower		x	x	x	x	x				
Temporary Chillies and peppers		x	x	x	x					
Tobacco		x	x	x	x					x
Tomatoes Covered			x	x	x					x
Tomatoes MC		x	x	x	x					
Tomatoes WC		x	x	x	x					x
Turf grass		x	x	x	x					x
Walnuts		x	x	x	x					
Watermelons		x	x	x	x					x
Wheat		x	x	x	x	x				x
Zucchini		x	x	x	x					x

Contact us for more information on which sensor is needed for each specific disease model.

🌐 https://metos.global/insect-monitoring/

Insect Management Tools

At Pessl Instruments, we understand the challenges behind the management and control of different insects in your fields. We have developed different tools that will help you prevent, detect and mitigate high populations of insects of economic importance:

Prevention: METOS takes frequent measurements which are continuously integrated with the temperature and give very precise information for many management decisions. In FieldClimate we have the **accumulator tool** that can help you calculate the amount of Growing Degree Days in a specific amount of time. The tool will give the calculations for Growing Degree Days, Growing Degree Hours and the results for Degree Days (max+min) /2 - base temperature formula as well. This is a regularly used tool to track the development of different insects and prevent high populations with applications of different control methods.

Detection: we understand the challenges behind the tracking of pests in your plantations. The **iSCOUT** line of products can be used to track and **detect** different pests according to your needs. Our developed algorithm can count and identify the insects that have been captured in a picture. You can either monitor insect populations remotely using iSCOUT traps, or you can use your smartphone to check your manual traps using iSCOUT Mobile.

Mitigation: Pessl Instruments has developed different insect models for a data-based control of insects in your fields. Together with the calculation of Growing Degree Days, FieldClimate can provide different **risk models** for insects in a wide range of crops. These models can be used to make informed decisions on the control and **mitigate** insect pressure in your crops. For more information and viewing the available insect models for each crop, visit: *metos.global/disease-models*.

Example of temperature accumulation as support for insects development monitoring
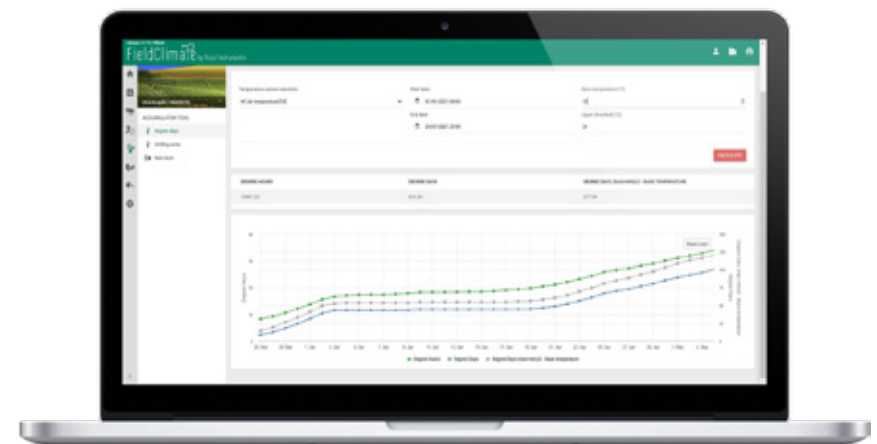
iSCOUT Mobile

DIGITALIZE YOUR MANUAL TRAP

🌐 https://metos.global/iscout-mobile/

iSCOUT Mobile combines our iSCOUT devices with commonly used manual trap devices (delta traps, chromotropic sticky traps, etc.). You can easily create digitalized traps, associated with the manual traps. You take a picture of the sticky boards with your phone, and the caught insects are automatically counted and identified in the app. A subscription for insect detection has to be activated to have the app working with full functionality.

FEATURES:
- Creation of digital traps.
- Automatic insect detection: the iSCOUT Mobile app automatically counts and identifies caught insects, saving you time and effort.
- Count presentation: visualize insect counts with intuitive charts for better analysis.
- Upload and store data on the cloud: picture and detection results are uploaded and stored in FieldClimate cloud and available via the web platform.
- Export functionality: download pictures and export trap data reports for comprehensive reporting and analysis.
- Access to iSCOUT electronic traps: the iSCOUT Mobile app provides the most complete mobile experience for the remote installed IoT iSCOUT traps.

GET IT ON Google Play

Download on the App Store
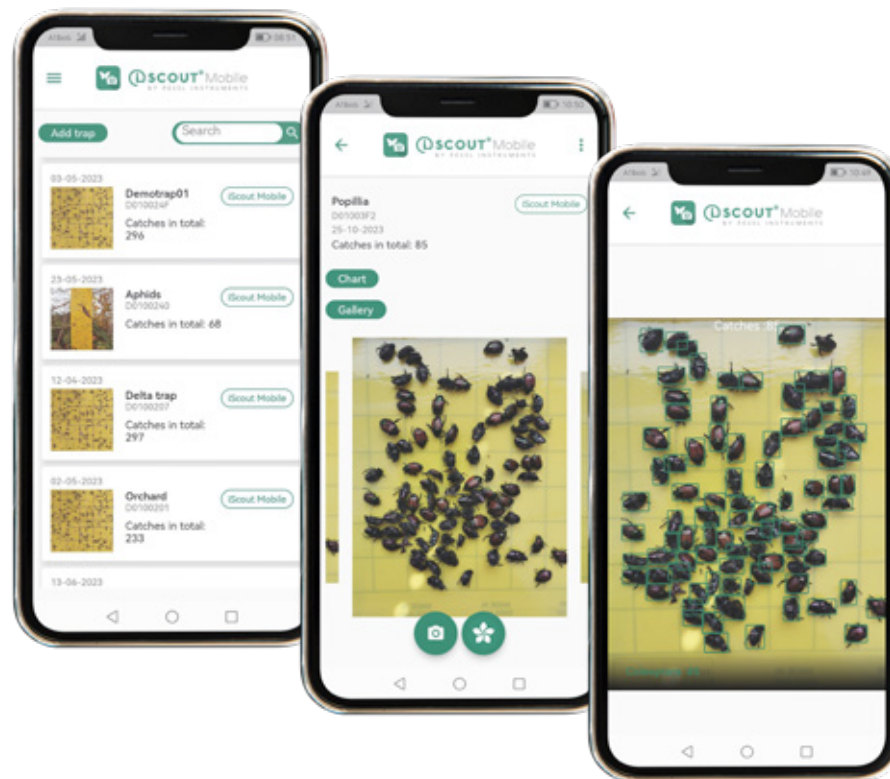
FarmView

FarmView enables you to visualize data at the level of farm, field and cropzone. **Data zonation, into cropzones,** in a combination between in-field METOS measurements plus satellite remote sensing data allows you to detect and **redirect the attention to specific spots**; optimizing field management.

The ability to combine what you see from the above - via **satellite imagery** - with in-field corrections, allows local improvements to **equalize field heterogeneity and upgrade yield**. Corrections can go from **irrigation management** (with a possibile precision positioning of soil moisture probes and weather stations) to **plant health adjustments** or DualEx and Mobilab readings to track nutrition conditions.

Moreover, **Daily Water Balance** is given as the output of crop evapotranspiration and irrigation records, to support **precise decision-making** in water management.

FarmView Satellite Page

Satellite remote sensing data quantifies **LAI (Leaf Area Index)** and **NDVI (Normalized Difference Vegetation Index)** on the cropzone level. These indexes give a full scanning of the field during crop development, also detecting anomalies within weaker and stronger spots regarding **biomass and plant health status**.
The page contains LAI and NDVI **graphs**, to monitor **crop growth status** (in qualitative and quantitative ways) throughout the growing season, together with **satellite images of 10-meter resolution**, derived from Sentinel-2 Satellite.
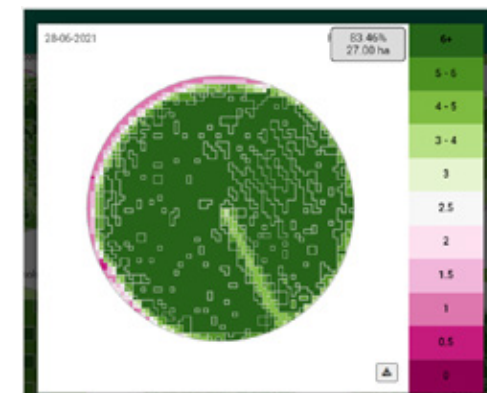
OPTIMIZE CROP GROWTH WITH IDENTIFICATION OF SPOTS THAT REQUIRE MORE ATTENTION IN YOUR FIELD!

FarmView Yield Prediction Module

This powerful tool utilizes a combination of real-time weather data based on your METOS virtual or physical weather station, localized seasonal weather forecasts, and your management practices to estimate your crop's yield. It offers invaluable insights for planning and decision-making.

KEY FEATURES:

- **Easy Setup:** Getting started is a breeze. Simply input your crop type, sowing date, and expected harvest date.
- **Highly Adaptable:** Whether you're cultivating winter or spring crops, early or late varieties, our module caters to your needs. Use the sliders to fine-tune the averages of expected maturity date and yield. For even greater precision, customize settings like initial soil moisture and soil type.
- **Yield Comparison:** See how your current season's yield prediction compares to the long-term average at a glance. This helps you assess whether your crop is likely to outperform or underperform relative to the historical mean.
- **Track Performance:** Keep a record of your crop's yield performance over time with the Previous Yields page. It's a convenient way to monitor your crop's progress in your specific crop zone.
- **Supported Crops:** Our Yield Prediction Module covers a range of important crops, including wheat, barley, canola, soya beans, potatoes, maize, durum wheat, and sugar beet.

With the Yield Prediction Module, you'll have the insights you need to make informed decisions about crop management such as fertilization, irrigation, and harvest planning.

Yield Prediction example:
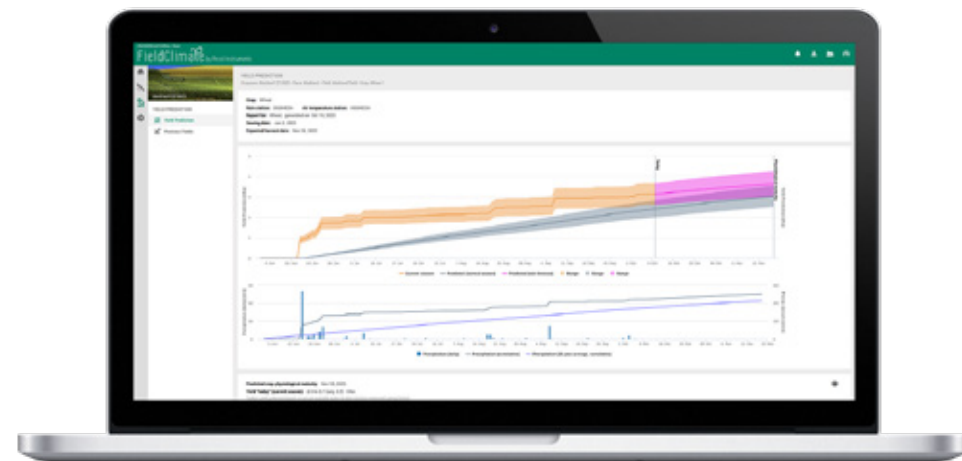
Previous Yields example:
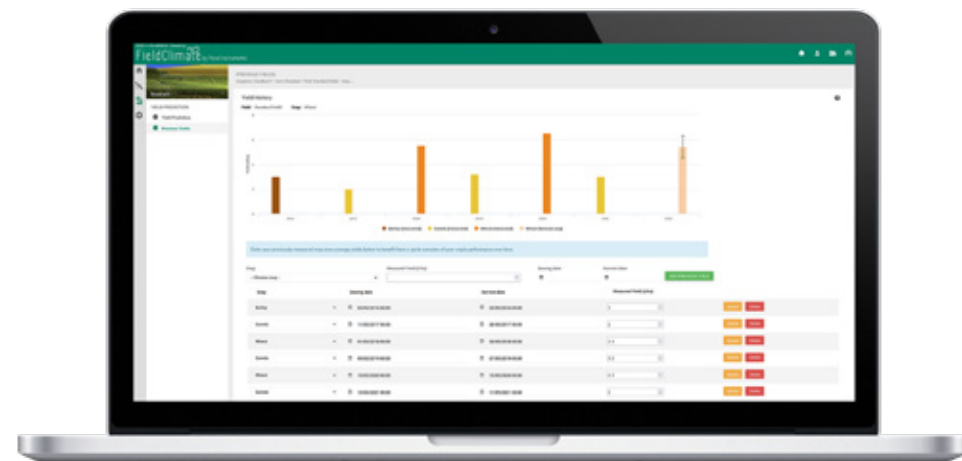
Irrigation Management

The **Soil Moisture page** in FieldClimate allows you to set budget lines for the track of a comfort zone to be maintained with a sustainable irrigation scheduling, based on volumetric water content or tensiometric soil moisture monitoring.

**AVERAGE GRAPH - COMBINATION OF ROOT ZONE SENSORS**
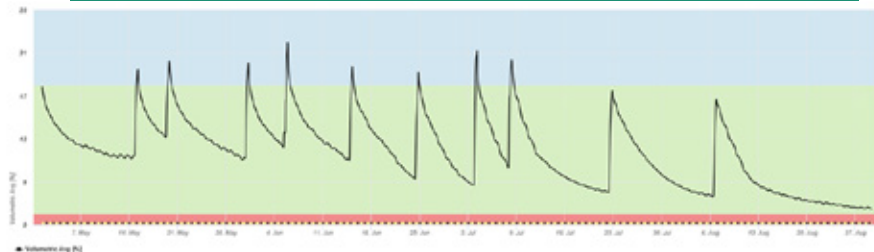
STACKED GRAPH
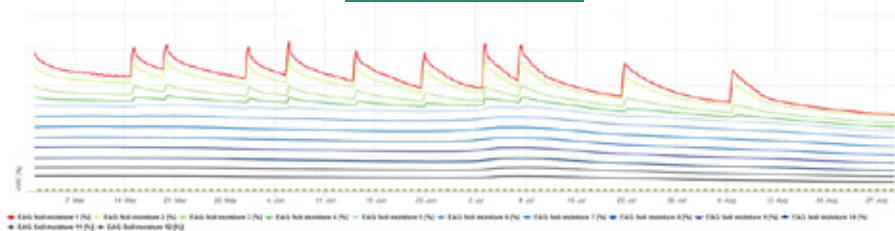
RAIN AND ETo

FarmView Water Balance Module

The **Water Balance module** (Irrimet) allows you to **better plan irrigation decisions** with crop evapotranspiration, rootzone development, precipitation and irrigation records as the inputs.

The Daily Water Balance, as the output, **provides a full view of water balancing status** throughout the season.

FarmView Soil Moisture Page

The **Soil Moisture Page** is a useful tool to **monitor soil moisture** via sum and individual depth behavior, measured by profile sensors. Furthermore, a soil moisture sum widget is displayed on the dashboard, **allowing quick evaluation and immediate actions**.
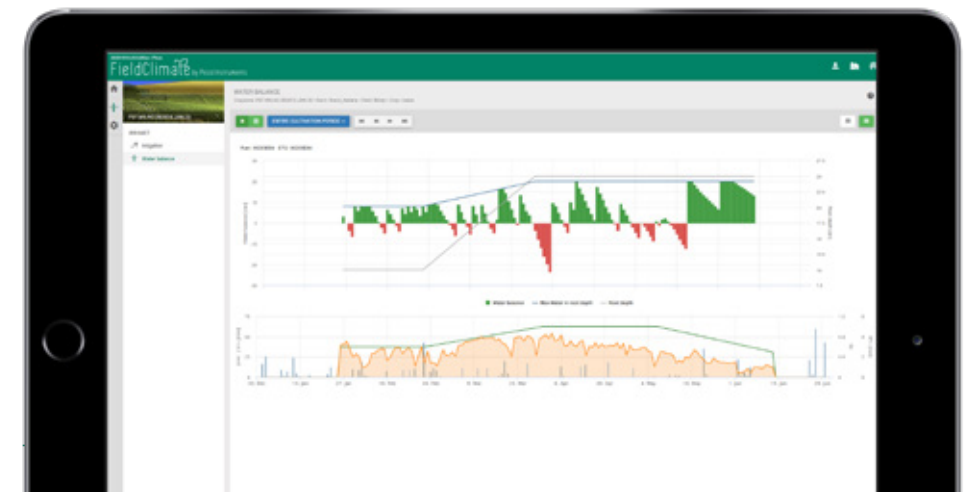
Animal Welfare

To meet the growing production demands with the increased focus on animal well-being it is crucial animal breeders constantly improve their existing practices, optimize production and improve-ensure the well-being of their animals. Early detection of stress indicators is crucial in the animal producing process and reacting at the slightest behavioural change is one of the best approaches to mitigating problems. Pessl Instruments offers solutions to cattle, swine and poultry breeders.

POULTRY

We offer extended functionality of several advanced micro-electronics devices that can be integrated into a smart cloud-based system to create audio and video based stress detection of chickens on farms, facilitating the improvement of the breeding process and to prevent chicken's health hazards.

DAIRY-CATTLE

Modern dairy cows are bred and fed for high productivity. As a result of this, the udders are a highly productive bioreactor. Along with milk, cow's highly active metabolism produces a lot of heat which must be transferred away from the cow. As a result of the

need for higher productivity, the awareness of dairy farmers to heat susceptibility of cows has increased. Optimum temperatures are in the range below 18°C. With temperatures above 24°C, significant reductions in herd productivity can be anticipated. With the help of Pessl Instruments products, all demands can be met.

SWINE

The climate in a swine pen has a decisive influence on the ability to utilize the genetic potential of your mast or breeding pigs. High relative humidity, a breeze of cold air in the building, or a cold main body will negatively influence the health of the pigs. High temperatures in the building or in the feedlot will decrease the efficiency and conversion rate of the fattening pigs. METOS products for continuous recording of all relevant data inside the buildings and holding parameters in the feedlot will help the farmer to stay in touch with his animals remotely 24/7. Automatic alerts will be sent in real-time if a defect of the heating or cooling systems happens.

We also offer a weather forecast based service for Animal welfare with colour-coded actions, preventing heat stress in poultry and increasing milk productivity for dairy cattle. This service is available with the Weather forecast subscription.

RECOMMENDED EQUIPMENT:
- **nMETOS** (See Technical catalog)
- **CropVIEW** (See Technical catalog)

Digital Integrations

For collecting-analyzing, and displaying agronomic, meteorological, soil, insect and tracking data from the farm, field or environment.

Available in multiple languages for tens of thousands of METOS weather station owners, it also can integrate data from third party weather stations- sensors and allows the customer to use the rich array of actionable tools in FieldClimate, e.g. disease models, irrigation, soil moisture monitoring, precision forecasts and work planning tools.

"THE INTEGRATION WITH VARIOUS SMART-AGRI SOLUTIONS DIRECTLY PROVIDES FARMERS WITH ACTIONABLE TOOLS, HELPING THEM EASE THE FARM MANAGEMENT PROCESSES, SAVE RESOURCES, AVOID COSTLY ERRORS AND EARN THE MOST OUT OF THEIR HARD WORK."

JOHN DEERE

John Deere Operations Center portal can display your METOS device information seamlessly. Simply grant your John Deere account to receive data updates from selected METOS devices. The latest sensor data can then be visualized by members of the selected John Deere organization at any time. The access grant can be revoked and synced devices can be activated and deactivated at any time.
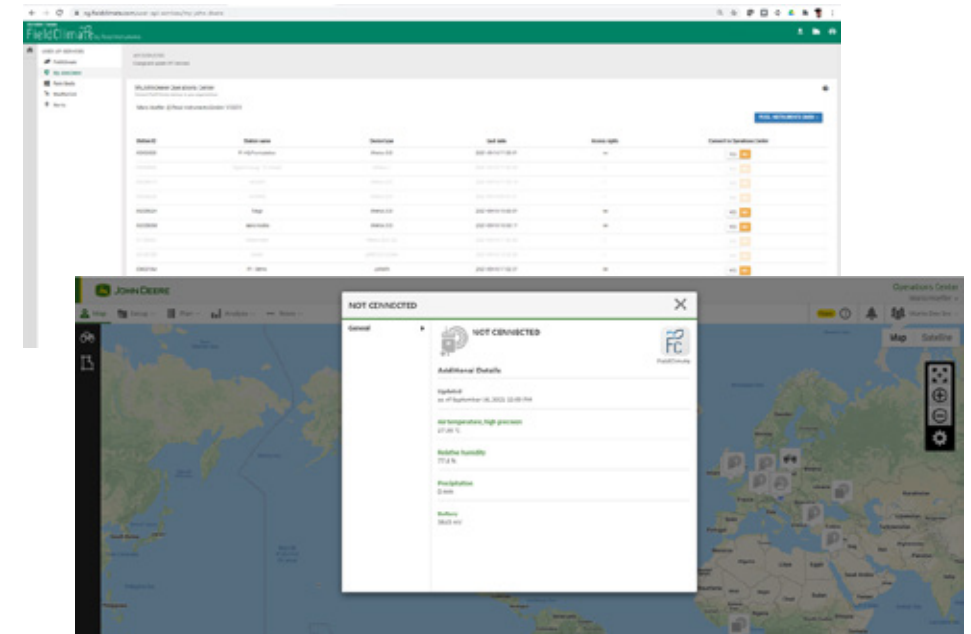
DAVIS INSTRUMENTS

The WeatherLink integration is a data pull from Davis Instruments, which uploads your Davis Instruments data into your FieldClimate account.

This ingested service requires a license because data is integrated into FieldClimate servers, which then offers the user a rich array of actionable tools available in FieldClimate, e.g. disease models, irrigation, soil moisture monitoring, precision forecasts and work planning tools.

HORTA

Horta provides highly-specialized services to the agricultural and agri-industrial sectors,which increases their competitiveness and sustainability while guaranteeing and enhancing food safety. Horta is a spinoff of the Università Cattolica del Sacro Cuore and was started in 2008 by five founding members, whose goal is to translate innovative research results into agricultural practices. Pessl Instruments and Horta have been working together for over a decade on hardware sales in Italy and other countries and Pessl Instruments now offers actively all the DSS (Decision Support System) from Horta to our clients.

RIMpro

RIMpro is a DDS (decision support system) that models a wide range of pests and diseases of fruit trees and vineyards. You now can connect the METOS weather stations to RIMpro' DSS thus allowing the user to evaluate the   risk of each pest and disease for your crop and farm.
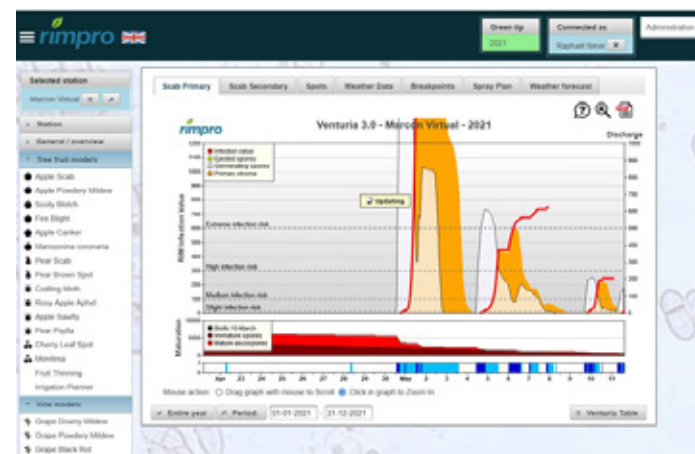
XARVIO®

xarvio® FIELD MANAGER can potentially use METOS station data for plant protection and climate-data-related services.

A special security key mechanism is used to create a data share in FieldClimate with xarvio® FIELD MANAGER. The security key is used in turn in xarvio FieldManager to allow the regular pull of data for the selected devices.

INSECT MONITORING

It pairs the unique hardware and software capabilities of Pessl Instruments, specifically iSCOUT pest trap,with the image recognition and analysis of BASF's xarvio® SCOUTING app. By combining the experience, precision data and advanced digital expertise offered   by both companies in pest management, farmers are provided with near real-time; field-level insect observations to further optimize crop production.

WEATHER MONITORING

Enabling the connection of weather station devices from both recognized companies,increases choice among compatible weather stations for xarvio® FIELD MANAGER customers. It also enhances crop production decisions, as hyper-local weather data from connected devices is seamlessly integrated into xarvio®'s agronomic algorithms and models.
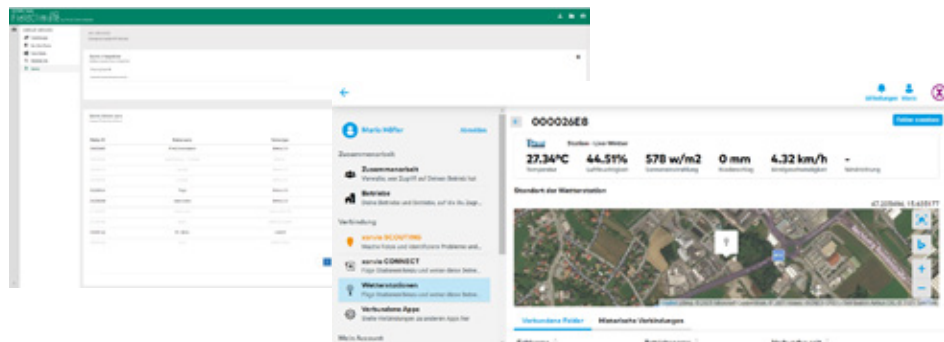

Myirrigation

The Myirrigation platform provides a complete workbench to manage irrigation and includes data display of actual weather, weather forecast, soil moisture sensors, water meters and all other sensors that are displayed in FieldClimate. The data from FieldClimate are taken through API.

Sentinel satellite images are integrated. Advanced features as data reports, soil moisture balance (FAO 56), and irrigation plan. Fields can be uploaded using different georeferenced file formats.a

It is the communication platform between irrigation managers and the field staff that implement the irrigations. Field notes and field visit reports are an essential to register progress of crop development and its response to irrigation facilitating the decision-making process for irrigation management.
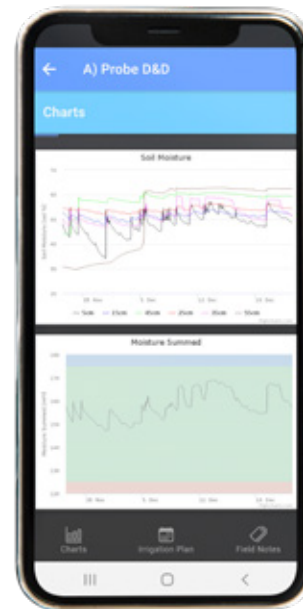

It is available in English, French, Portuguese (PT and BR), and Russian. Web version and APP for IOS and Android are included. For more information visit aquagri.
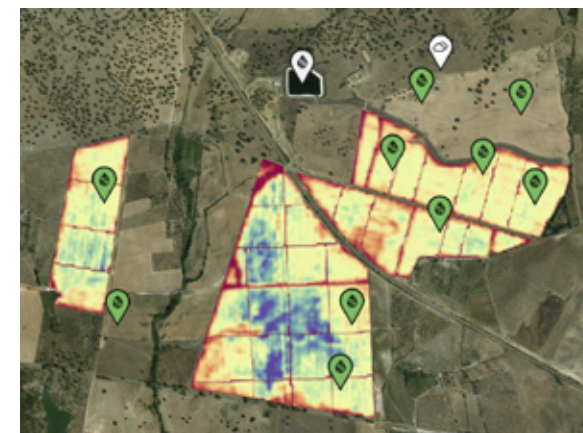
GoClimate.PRO

The platform is a source of complete information at highest level, to guide our clients in making assertive decisions.

One plataform empowering multiple verticals: Agribusiness, Smart Cities, Energy, transport, highways.
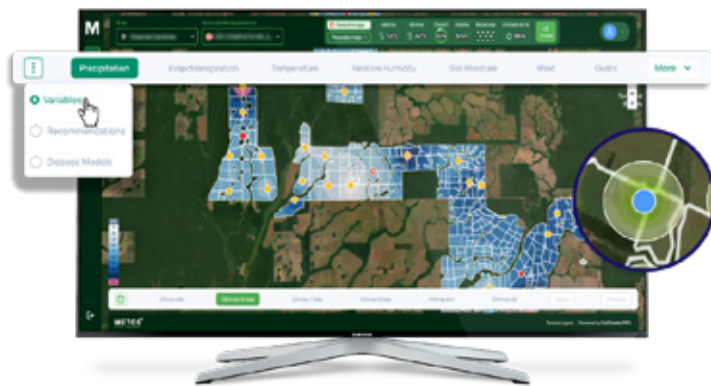
Monitoring points influence radius.

MAP-BASED INTERFACE
Explore multiple variables, personalised recommendations all on a single screeen. Interpolated Weather maps are also available.

Ready for professionals.

With Multi-Screen monitoring you can check more than one information, in different places at the same time. A friendly interface for complex data.

Multiscreen TVs

TIME CONTINUUM NAVIGATION
Select different periods for analysis. Past, present and future, all on a single screen. Analyze in-depth data from one point with just 2 clicks and quicly return to the initial view, maintainig a focused view of the entire area.

API for Partners

API - ACCESSING PURE DATA & SERVICES TO ENABLE CUSTOM INTEGRATIONS

The FieldClimate API is a HTTP/S web service where authenticated and authorized web clients can retrieve METOS data and licensed services via JSON format. Updating device configurations is possible as well. The FieldClimate portal, the FieldClimate mobile apps and a data push to John Deere Operation Center are some prominent API example use cases.

For stability reasons, the API is versioned. Two ways of user authorization are supported:
a. HMAC access based on a private and public key pair often used for machine-to-machine integrations and
b. OAuth 2.0 which requires FieldClimate client credentials forgetting a temporary access token for your pre-registered app (contact api@metos.at).

- **API Documentation:** https://api.fieldclimate.com/v2/docs/
- **Postman Collection:** https://docsdev.fieldclimate.com/
- **Examples:** https://bitbucket.org/pesslinstrumentsgmbh/api-examples
- **Activate API Subscription & get your access keys** from here:
  https://fieldclimate.com > User menu > API services

MEDAS (METOS DEVICE AGNOSTIC SOLUTION)

Our new data ingestion endpoints allows users to seamlessly send data from third-party external devices to the FieldClimate ecosystem. Once data is ingested, it becomes accessible within FieldClimate applications & via API to leverage advanced features like disease models and weather forecast, ensuring comprehensive insights for users.
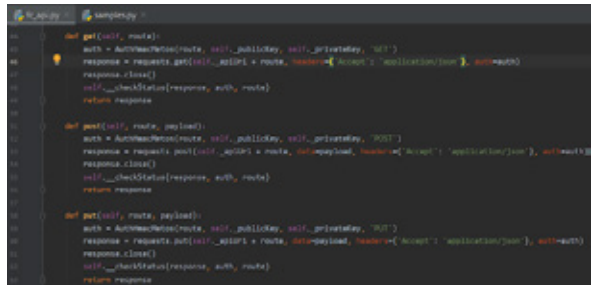
The FieldClimate API is used by hundreds of 3rd party software clients in order to see METOS station data in their specific software solutions and platforms for various use cases. Device owners can get access to their data hosted on the Pessl Instruments Cloud located in Graz (Austria); via our API or our FieldClimate app by activating subsequent subscriptions for data access.

PI API SUBSCRIPTIONS

Tier 1	Tier 2	Tier 3
(Tier 1 Access)	(Tier 2 Access)	(Tier 3 Access)
Up to 48 req /day/device	Up to 500 req /day/device	Up to 1500 req /day/device
Data access limit - last 31 days	Data access limit - last 365 days	Data access limit - full historical data

Chargeable devices: all weather stations and more compact monitoring IoT devices (iMETOS, µMETOS, nMETOS, MiniMETOS), camera products (iSCOUT and CropVIEW, excluding the Control Units) and sampling devices (SoilGuard, Dualex). Excluded are Work Track devices, virtual devices such as virtual weather stations and digital traps (from iSCOUT mobile), as well as external devices with data ingested in FieldClimate, which are already subject to dedicated subscriptions.

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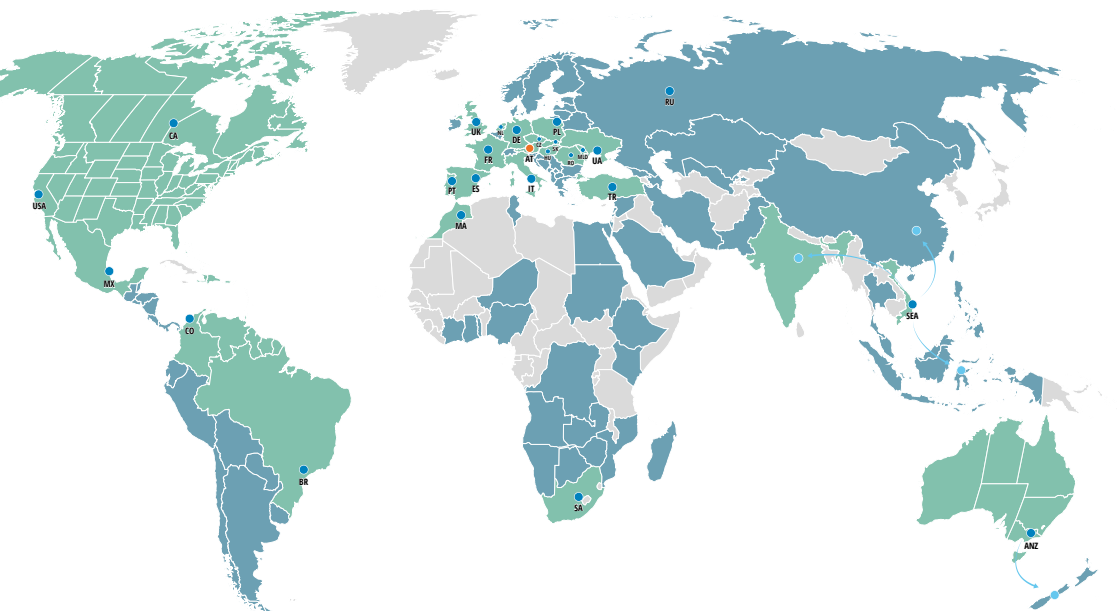erik.bijwaard@metosfrance.fr

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