METOS®
BY PESSL INSTRUMENTS

Pessl Instruments
corporate presentation 2023/2024

METOS®
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Experienced, Global, Successful!

REPRESENTATIONS DEALERS & AFTER-SALES SERVICE POINTS:

All EU Countries

Middle East:

- Egypt, Iran, Israel, Lebanon, Palestine, Saudi Arabia, Syria

Asia:

- Azerbaijan, China, India, Indonesia, Kazakhstan, Malaysia, Pakistan, Philippines, Thailand, Uzbekistan, Vietnam

North America:

- USA & Canada

Central America:

- Mexico

South America:

- Argentina, Bolivia, Brasil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay

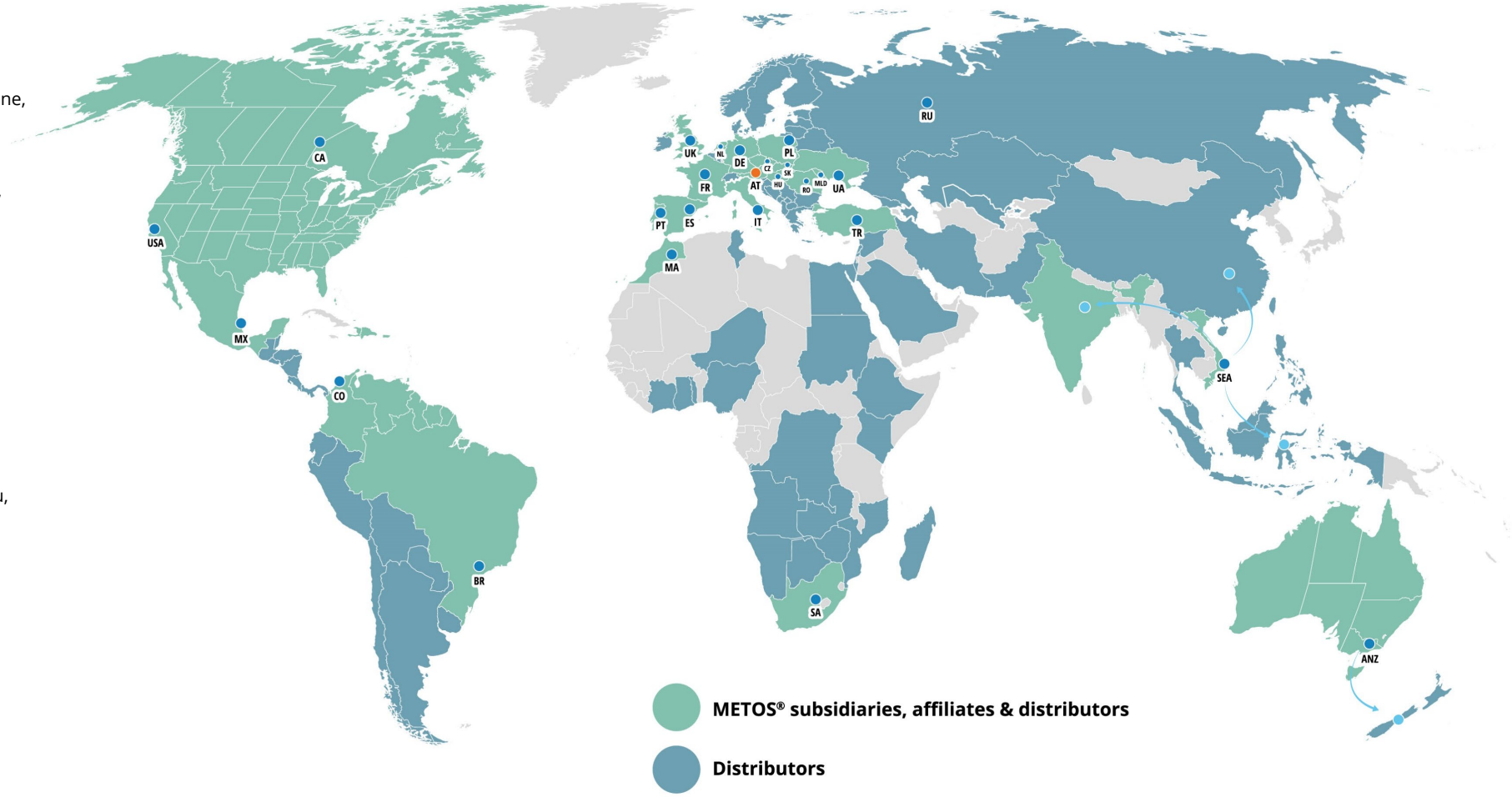
Africa:

- Ethiopia, Ivory Coast, Kenya, South Africa, Tunisia

Australia & New Zealand

HEADQUARTERS:
Weiz, Austria

AFFILIATES & SUBSIDIARIES:
Stationed in **25 countries worldwide**



METOS®
BY PESSL INSTRUMENTS

The Revolution of decision-making for the Connected Field

All the tools one needs in one place

We help reshape agricultural practices that will have a positive impact on everyone involved – from farmers to consumers. With technologically advanced agriculture hardware & software solutions, we help farmers all around the globe **make** their **farming profitable, efficient and sustainable.**

The thought about sustainability is one of our keystones when it comes to the development of new METOS® products and solutions. With the Green New Deal, we are even more determined to continue in the direction we set out at the very beginning of the establishment - help the farmers achieve the best yield, without compromising the environment.


OPTIMAL RESOURCE USAGE


SAVED TIME & MONEY


HIGHER YIELD


PREMIUM QUALITY


FOOD SAFETY


ENVIRONMENT-FRIENDLY


SUSTAINABLE


BIODIVERSITY CONSERVATION

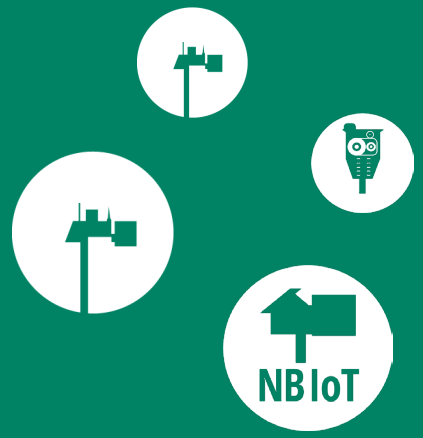
Value Proposition

The METOS® Decision Support Systems plays an important role in collecting environmental data, used for the optimization of farm management activities and enhanced fieldwork planning including:

- irrigation management,
- insect and disease monitoring,
- plant protection and fertilizer applications,
- field accessibility & field activities in only optimum conditions,
- sowing, seeding, harvesting.

BETTER MANAGEMENT, OPTIMIZED INPUT,
BETTER QUALITY, RISK REDUCTION, HIGHER ROI

METOS® ecosystem



Various weather stations & data loggers in the field collecting environmental data

State-of-the-art software application, **FieldClimate** collects, calculates, analyses and graphically presents the data measured by the installations in the field

Wireless, solar-powered monitoring systems collect the data, and once all the data comes together on the FieldClimate platform, you see what a powerful Decision Support System tool METOS® is.

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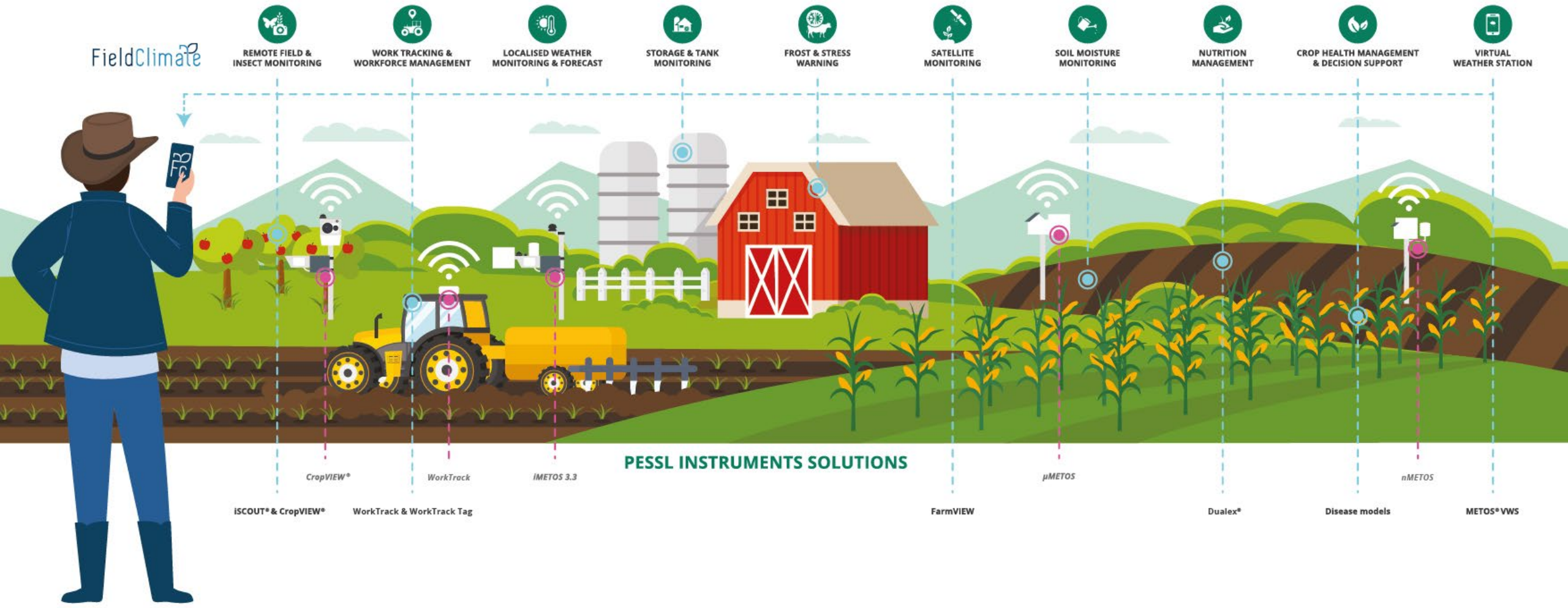
Nested Approach to IoT Agriculture

Nested approach to IoT agriculture **combines** installing various types of **weather stations, sensors and data loggers** in the field, and making decisions based on the calculations, analysis and predictions shown in an **software application**. And METOS® has both - hardware and software solutions that work in your favour.



Leading Partners

GLOBAL INTERFACE PARTNERS

LINDSAY · JOHN DEERE · meteoblue weather close to you · esa · NEXT Farming · HORT@ From research to field · CLIMATE FIELDVIEW

LoRa · TALGIL Computing & Control Ltd. · DKE DATA · planet. · xarvio Digital Farming Solutions · Cropwise · LAT Nitrogen · Microsoft Azure · aws

API PARTNERS

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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 OUR CULTURE, YOUR WELL-BEING · UPL OpenAg

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PRODUCT PORTFOLIO
Hardware and software solutions

METOS®
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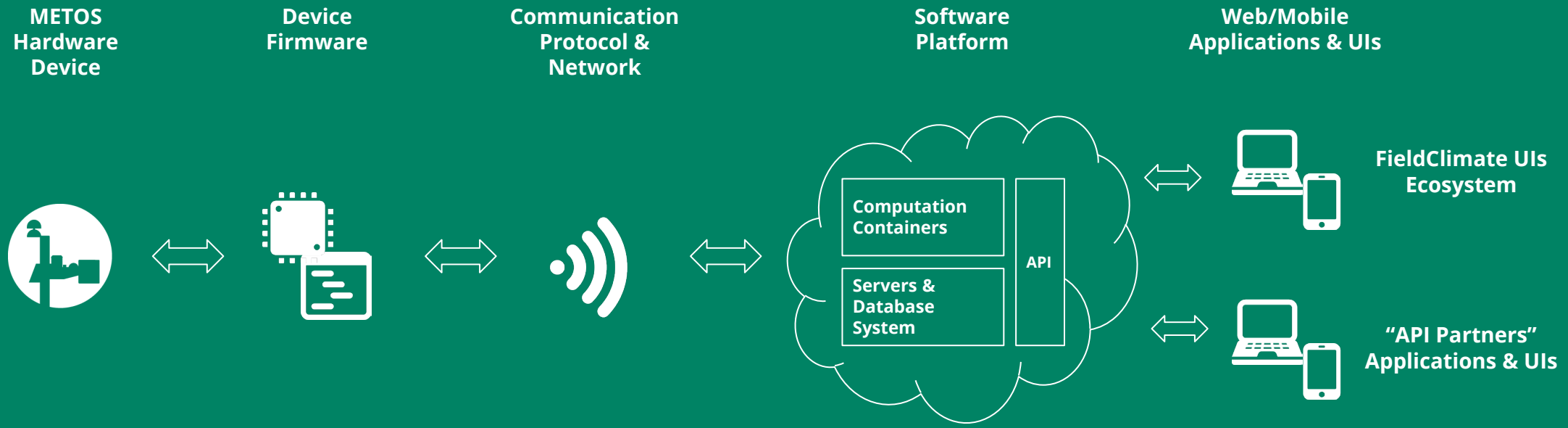
METOS® by Pessl Instruments IoT Technology Ecosystem



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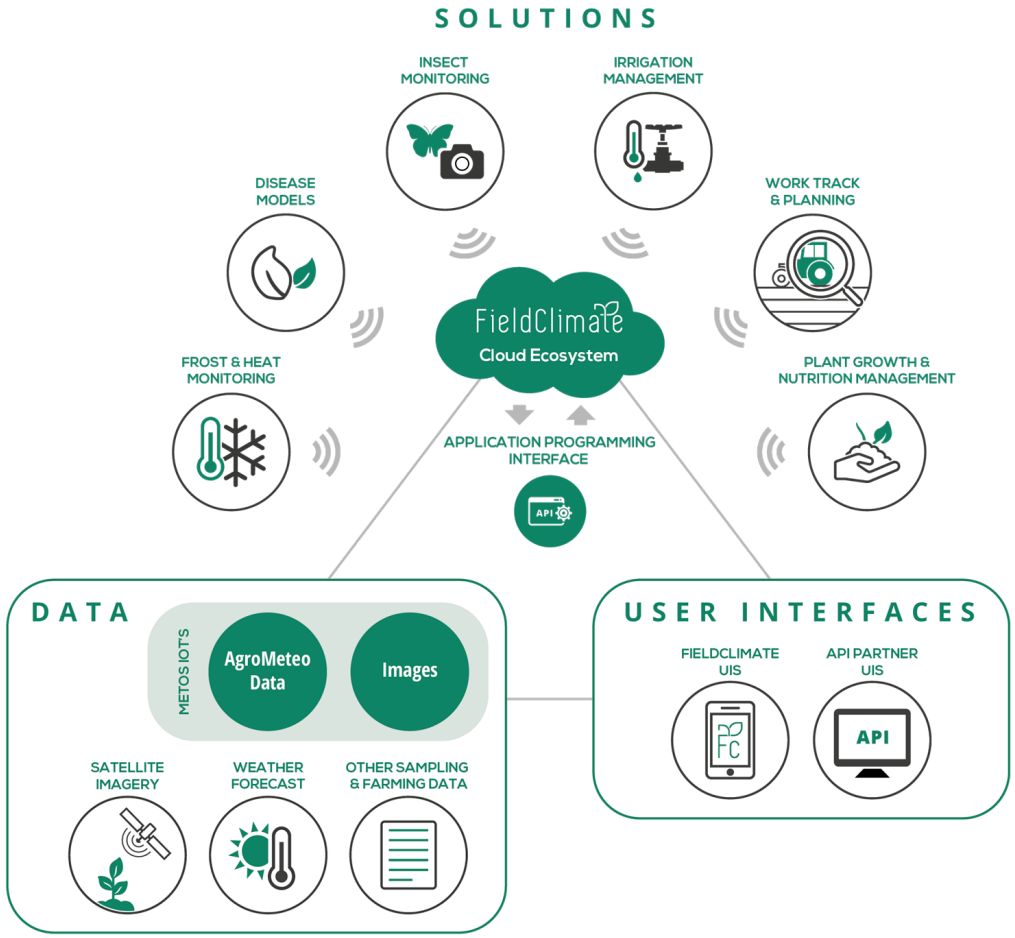
Hardware and software solutions

Holistic solutions for precision agriculture

METOS® solutions focus on a combination of deployed hardware (IoT) and software (Saas) to give the users the crucial environmental information for actional decision-making. The measurements done by the weather stations and other data loggers in the field and the calculations and analysis done in FieldClimate are the comprehensive solution for the efficient management of all farming activities.

METOS® solutions



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METOS®
WEATHER STATIONS & DATA LOGGERS

METOS® HARDWARE PORTFOLIO

Various types of weather stations, data loggers and solutions under the METOS® umbrella are distinguished by:

- Features and benefits
- Purpose of use (irrigation management, plant protection, yield prediction, etc.)
- Possible (additional) configurations

In general, we have the following groups of weather stations:

- **METOS® VWS** - virtual weather station
- **nMETOS** - zero to semi-flexible
- **µMETOS** - semi-flexible
- **iMETOS** - fully flexible (deliverable upon request)

and other IoTs and specific products that measure a variety of environmental parameters (eg. MiniMETOS for soil moisture and soil temperature).

METOS® VWS - Virtual Weather Station

METOS® VWS - virtual station exists for any point on the Earth for which meteoblue can derive weather data. The data is not the result from a physical 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.

KEY POINTS

- Perfect entry point to precision agriculture
- No sensors = no maintenance
- Same range of weather-data based solutions as a physical station

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miniMETOS

miniMETOS is a combination of sensors that measure soil temperature & Volumetric Water Content (VWC) (Pessl Instruments Soil moisture sensor) and soil moisture (Watermark sensors) permanently and in near real-time wherever you want on your course (Tees, Fairways, Greens…). The device provides you information about the exact amount of moisture and the soil temperature to help you plan the irrigation event and possible stress points in a timely fashion. With miniMETOS all the potential issues and stress events can be identified before they occur or become visible.

KEY POINTS

- Permanent measurement of soil moisture and temperature at any location
- Quick installation
- Cost-effective and durable
- Mostly use on **golf courses, stadiums, parks**

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METOS® FWT

METOS® FWT is an IoT (Internet of Things) device designed to monitor the water level depth in flooded rice fields in real-time. The solution supports farmers in the adoption of the Alternate Wetting and Drying (AWD) methodology or similar water saving techniques. METOS® FWT can be a very helpful tool supporting decisions to mitigate risks due to periods of water scarcity.

KEY POINTS

- Reduced irrigation water input
- Decreased global warming potential from rice cultivation by 57–74%
- Increased fertilizers utilization efficiency

METOS®
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nMETOS

nMETOS line presents an entry level weather stations that operate on NB-IoT network. It is a decision-support tool that helps protect the crop throughout the season which results in a boosted yield at the end of one. It was designed in cooperation with those who use it - farmers. They require a highly reliable sensor set permanently connected on the mobile phone, precise data reachable within seconds, long range communications, and an extended battery life. nMETOS combines all of the mentioned features.

KEY POINTS

- Measurement of the most important environmental parameters
- Preventing diseases and insect infestation
- Spray weather warning and recording
- Time management
- Resource savings

METOS®
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µMETOS

µMETOS is a LPWAN weather station that is designed to monitor all of the most important environmental parameters:

- rain, air temperature, relative humidity
- soil characteristics - soil moisture, soil temperature, and electrical conductivity
- water pressure

But also others, such as leaf wetness which is crucial for plant disease predictions. Data is consistently measured in 5-minute intervals and sent every 15 minutes to the server. All the data is synchronized with FieldClimate.

KEY POINTS

- Low cost, low power consumption and long range connectivity
- Multiple sensors connected to the same base unit
- Remotely configurable
- Soil moisture
- Disease modelling

METOS®
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iMETOS 3.3

iMETOS 3.3 is a durable and flexible weather stations for measuring all climatic conditions, powered by rechargeable batteries and a solar panel. The station has a built-in UMTS/ CDMA modem for direct communication with the FieldClimate platform, and can handle up to 600 sensors through the intelligent sensor bus system. The system is extremely reliable due to a non-volatile internal memory and can store more than 8 MB of logged data (cca. 1 month).

KEY POINTS

- For improving plant protection with disease models
- Soil moisture monitoring and irrigation management
- Frost monitoring and alarms
- Combines the features of other METOS® stations
- Can handle up to 600 sensore on one unit

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ICA10 - Irrigation Automation

ICA10 is a smart system which uses the data from a flow switch to monitor and operate the irrigation system. With the help of partner platform Spherag, sensors for soil moisture, temperature, relative humidity, wind, rain, water counter, pressure transducers, etc. can be used to automatically switch the solenoids. ICA10 works with the most common solenoids from Baccara, TORO, Rainbird, Netafim, etc. to make irrigation/fertigation cycles more intelligent, based on data and real plant requirements.

KEY POINTS

- Irrigation automation
- Water management & usage optimisation

METOS®
BY PESSL INSTRUMENTS

iSCOUT®

iSCOUT® is a combination of hardware and software solutions for remote monitoring of different pest insects. The iSCOUT® is an insect trap with integrated electronics and sticky plate. Due to its low weight, it can be hung wherever in the field. The device is self-sufficient, as it is powered by a solar panel and a battery. 10 MP camera takes high-resolution pictures of the sticky plate within the iSCOUT® trap. Images are sent via LTE to an online platform where they are analyzed and counted with automatic pest detection framework, using AI and self-learning algorithms. All data from camera system and AI software is displayed online, on the FieldClimate platform.

KEY POINTS

- Pest monitoring
- Preventing damage on crops and fields
- Reducing the use of pesticides or insecticides

METOS®
BY PESSL INSTRUMENTS

CropVIEW®

CropVIEW® is an agricultural information system, which periodically takes high resolution photos of farmland, research plots, crop canopies, orchards etc. Photos are automatically uploaded to FieldClimate platform, thus allowing a constant crop quality and yield control. The high resolution pictures enable checking seeds for germination, monitoring the effect of fertilizers and pesticides on crop development, and help decide whether a disease or pest already threatens profitability. High-resolution images can be viewed and analysed daily over time without any additional effort.

KEY POINTS

- Preventing damage on crops and fields
- Reducing the use of pesticides or insecticides
- Yield forecast of fruit crops through AI on following crop growth

METOS®
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WorkTrack & WorkTrack Tag

WorkTrack is an automatic tracking system used on self propelled vehicles and farm machinery like tractors or combines. With WorkTrack you have your fleet always under full control - you know exactly when your drivers are coming and going. The WorkTrack agriculture GPS tracking unit combined with the WorkTrack Tag feature allows you the capability of both fleet tracking and asset tracking, to manage your entire farm - from equipment to employees.

KEY POINTS

- Activity report about where, when and how much the machines have been running.
- Current positions of all active machines
- Enhanced work planning

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Dualex

Dualex is a leaf clip sensor which measures chlorophyll and polyphenols content of plant leaves. Thanks to a patented technology, this optical sensor allows simple, fast and nondestructive measurement of chlorophyll, flavonols and anthocyanins in leaves.

KEY POINTS

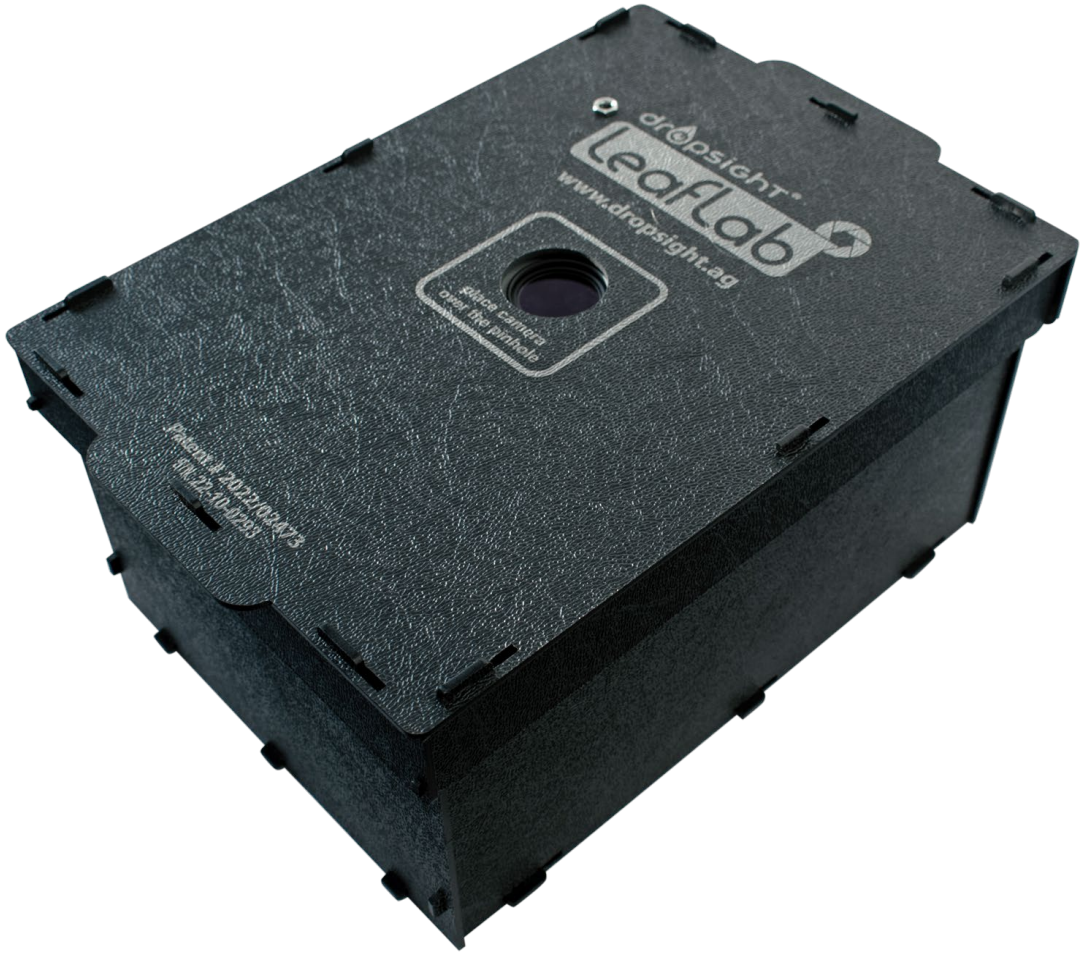
- Indicator of plant nitrogen status
- Insights into plant growth and yield potential
- Optimising/reducing the use of fertilizers

METOS® Storage

METOS® Storage is a multipurpose electronic device providing automated real-time information. It was designed to collect,
analyze and help to control storage conditions.
It measures the most critical parameters such as CO2, temperature, and relative humidity in real-time and where it is needed the most – in the middle of the storage.

KEY POINTS

- Preventing damage/rotting of crop before it occurs
- Storage management
- Fine tuning of the environmental conditions inside the storage



Dropsight®

DropSight® is an easy-to-use, scientifically developed tool for measuring spray deposition efficiency of the formulation on natural plant surfaces. Through the specially designed photographic laboratory (LeafLab), UV fluid (UView) and the DropSight® app for a smartphone, one can stop guessing and make informed decisions based on quantitative measurements of spray deposition.

KEY POINTS

- Measuring spray deposition efficiency of the formulation on natural plant surfaces

N-Pilot®

N-Pilot® is a portable reflectometer, measures the nitrogen nutritional status of crops by assessing the plant's chlorophyll content and the amount of biomass. N-Pilot® provides a nitrogen fertilization recommendation that includes all top-dressings for cereals and the total N-requirement for rape seed after winter.

KEY POINTS

- measuring the nitrogen nutritional status of crops
- determining fertilization application

METOS®
SOFTWARE

METOS®
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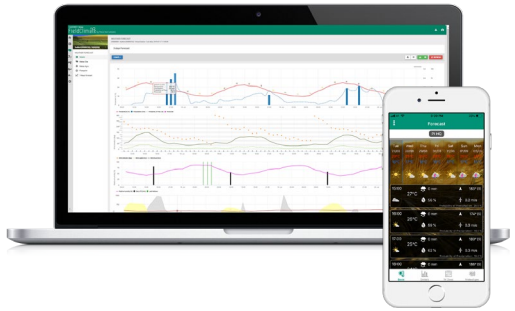
FieldClimate

More than just an app

All the data is safely stored & accessible instantly

FieldClimate, a precision agriculture software, is a cloud-based tool that helps farmers make important decisions for the next field activity which will help maximize their yield while preserving their resources - from time to money, fertilizers, water, and more.

FieldClimate is more than just an extension of the hardware - it is their brain. It gathers, calculates, analyses, and graphically presents the data that comes from measurements done by the sensor (sets) in the field.



METOS® & Fieldclimate - Decision Support System

With activating weather forecast and disease model licences for FieldClimate, you get an extensive group of services that help with accepting every important farming decision.

METOS® DIGITAL AG SERVICES:

- **Weather forecast & monitoring**
- **Disease modeling**
- **Insect monitoring**
- **Work planning tools:**
  - Plant nutrition
  - Field accessibility
  - Tillage ability
  - Sowing window
  - Plant protection
  - Harvest window
- **Dairy and poultry stress monitoring**
- **Accumulator tools:**
  - Degree days
  - Chilling units
  - Rain sum
- **Data storage & API**
- **Data statistics & modeling**
- **Notifications & alarms**

PROVIDE:

- Information about proper **time of planting, sowing, harvesting, ...**
- Help with decision on **timely fertilizer application**
- **Real-time weather forecast** and **monitoring** for a specific location
- Optimal **crop health management** schedule
- Spray **quality** assessment
- Optimal **irrigation** planning
- Perfect **storage-conditions monitoring**
- **Crop growth control**
- **Yield prediction**
- **Resource management**

- ✓ Optimal Resource Usage
- ✓ Saved time, money, resources
- ✓ Higher Yield
- ✓ Premium Quality
- ✓ Food Safety
- ✓ Environment Friendly
- ✓ Sustainable
- ✓ Biodiversity conservation

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✓ Environment Friendly

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✓ Biodiversity conservation

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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 allow users 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.**

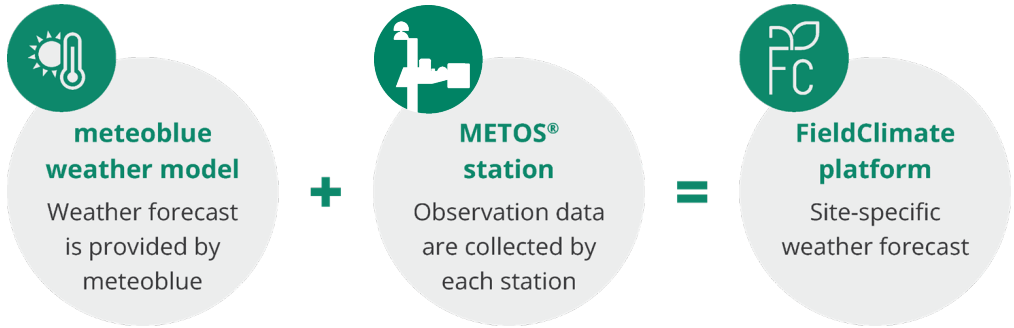
KEY POINTS

- Water balance & soil moisture
- LAI (Leaf Area Index)
- NDVI (Normalised Difference Vegetation Index)
- Biomass & plant health status

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 latest data from your station, satellite, and radar. Artificial intelligence is further used to increase the model's skill and optimally combine/select the best forecast models at any particular location.



KEY POINTS

- Better plan & organise work
- Protect crop from frost, drought
- Reduce & optimise fertilizer and water use
- Know when to plant, sow & harvest
- Maximise yield and quality

Global Weather Maps & Radar

REAL-TIME MONITORING, NOWCASTING AND FORECAST

The new radar function shows up to 24 hours of precipitation radar and satellite in 15 minute steps - worldwide, seamless, animated. Thanks to the real-time map animation, we can see in which direction the precipitation is moving, whether it is attenuating or intensifying

- Satellite clouds
- Radar precipitation (ground or satellite)
- Lightning
- Update every 15 minutes
- 24-hours backwards
- For the USA and EU, high-resolution 1-hour and 2-hours forecast
- Highest proven accuracy for all elements
- Screenshot function for saving as .jpg
- Seamless zoom and pan function

Extreme Weather Monitoring & Forecasting

The Extreme weather page is dedicated to Frost Events or Heat wave 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 the user has set the thresholds specific to its needs under Settings SMS Warnings/Notifications: blue line (Warning SMS) and green line (Notification).

Work Planning Tools

Workforce planning, Field accessibility, spray weather

SAVE TIME, INCREASE YOUR YIELDS

A 3 or 7-day weather forecast of all the important meteorological variables including services such as work planning, animal production, and disease risk models, helps:

- 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
- Protect your crop from frost by monitoring accurate temperature forecasts updated on an hourly basis
- Optimize and reduce crop treatments based on site-specific disease models and predictions
- Plan your fertilization application with accurate hourly weather forecasts
- Plan your irrigation based on actual ET-crop use and predicted plant water use
- Know the best hours to access your fields for the next several days based on soil tractability
- Know when to plant, sow, and harvest your crop considering adequate availability of seed zone soil moisture, optimal temperature, and more weather conditions
- Maximize your yield and quality with optimized weather risk forecasts of your fields

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.

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.

KEY POINTS

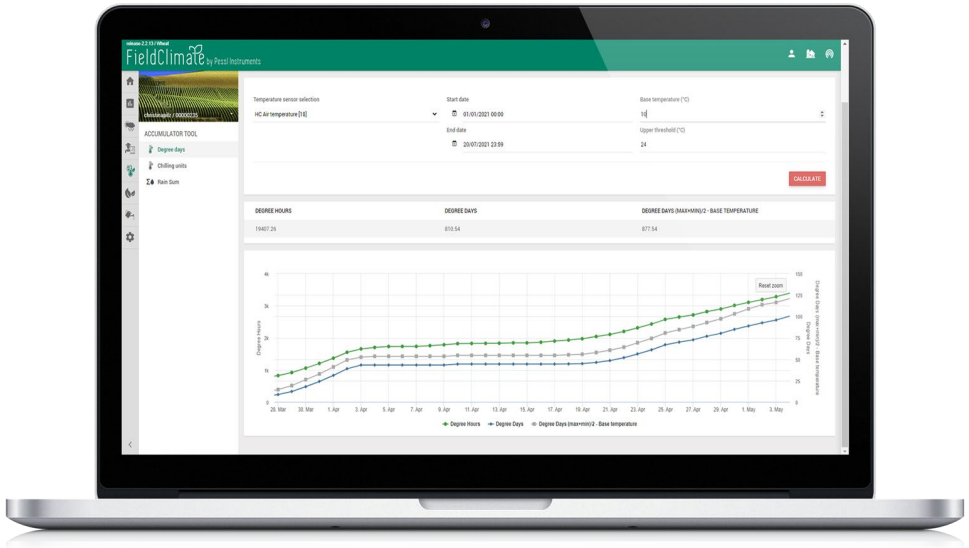
- Over 85 different disease models for more than 40 different crops
- Prevent diseases before they occur
- Apply fertilizers and pesticides at the right time

Details: www.metos.at/disease-models

Insect Monitoring

INSECT MONITORING USING DEGREE DAYS/HEAT UNITS

Degree Days are used to predict insect life cycles, therefore used to target specific stages (larva, adult etc..) by insecticide treatments. Insects are exothermic (“coldblooded”) organisms, that means their development is influenced by the surrounding temperature. Accumulation of so called “Degree Days” reflects those developments. FieldClimate calculates with the input of those lower and upper developmental thresholds as well as starting date the accumulated Degree Days for each specific insect stage. METOS® takes frequent measurements which are continuously integrated with the temperature and give very precise information for many management decisions.



Example of temperature accumulation as support for insects development monitoring

KEY POINTS

- The optimum temperature for insect development
- Frequent measurements to act on time

iSCOUT® Mobile

DIGITIZE YOUR MANUAL TRAP

iSCOUT® Mobile combines our iSCOUT® devices with commonly used manual trap devices (delta traps, sticky traps etc.). The user can easily create digitized traps, associated with the manual traps. The user takes a picture of the sticky boards with his phone, and the caught insects are automatically counted and identified in the app.

MAIN FEATURES:

- Creation of a manual trap
- Creation of a digital trap
- Pictures stored and saved on the gallery page
- Automatic detection (sum of counts) and identification
- Clients correction modus (correct annotations)
- Count presentation (chart)
- Export of traps (reporting) via CSV file

Integrations

FieldClimate is one of the first worldwide web platforms specifically designed 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.

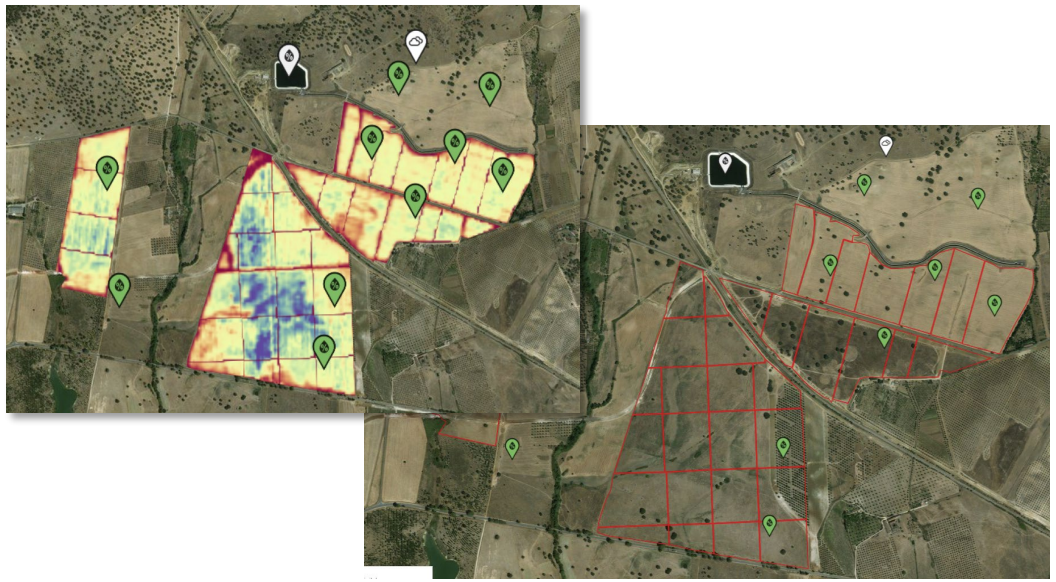
KEY POINTS

- Actionable tools
- Helping ease the farm management processes
- Save resources, avoid costly errors
- Earn the most out of the input

INTEGRATION PARTNERS

- **John Deere**
- **Davis Instruments**
- **Azure FarmBeats**
- **HORTA**
- **RimPRO**
- **xarvio™**
- **Myirrigation**

and many more



API for Partners

API - Accessing pure data & services to enable custom integrations

The FieldClimate API is an 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 for getting a temporary access token for your pre-registered app (contact api@metos.at).

METOS®
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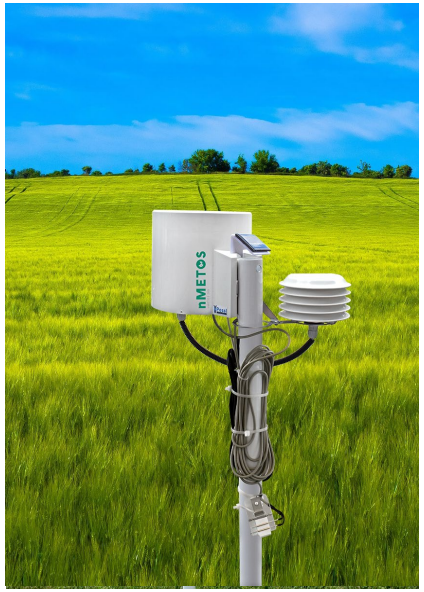
Pessl Instruments products are used on all five continents!










Thank you

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