



The soil leads to success

IMAGE SOURCE: AMAZONEN-WERKE H. DREYER SE & Co. KG

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1 October 2025 by AMAZONEN-Werke H. Dreyer

- **AMAZONE's SoilDetect system uses multi-sensor and geo-electric measurements during soil tillage to assess soil conductivity.**
- **AI processes sensor data combined with satellite images and soil assessments to create detailed, site-specific soil maps.**
- **These maps enable targeted, part-area management of fertilization, pH, sowing, and soil tillage to optimize resource use and crop yields.**
- **SoilDetect integrates with ISOBUS-equipped cultivators and the AmaConnect cloud platform for data sharing and decision support, enhancing farm management efficiency.**

SoilDetect for AMAZONE cultivators generates small-area maps of the field

As part of the BMLEH's Soil4Climate joint project, **AMAZONE** is working with partners FieldExpert GmbH, exatrek GmbH, Osnabrück University of Applied Sciences and the JKI, plus the associated companies Westrup-Koch and Brunotte, on a system for recording soil conductivity during soil tillage. The project was initiated by the Lukas and Dr Joachim Brunotte practice, funded by the BMLEH and successfully trialled at two locations in northern Germany.

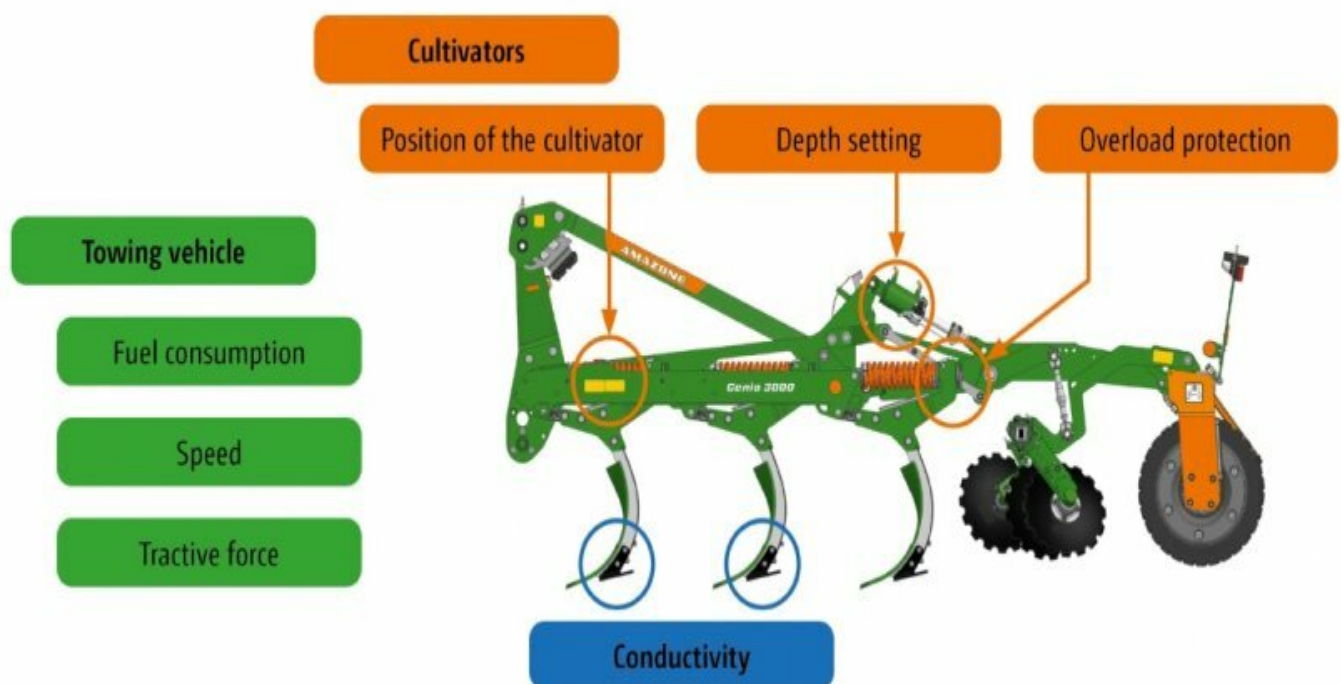


The Ceus-TX in use with SoilDetect for data recording during the pass

IMAGE SOURCE: Field-Expert GmbH

In general, intelligent soil tillage implements already offer the possibility of collecting useful data via sensor systems during the tillage operation. This data can be used during the actual work process, for pre-planning, in real time or downstream, to adjust various parameters such as working depth, working speed, slip and

overload. Some of this data can also be used for mapping and additional tasks. To derive yield potential, there are few systems available today that can record the soil type and condition during soil tillage. However, if you want to detect easily the type and condition of your soil and use the data to optimise subsequent work processes and the use of resources, the SoilDetect system is the perfect tool.



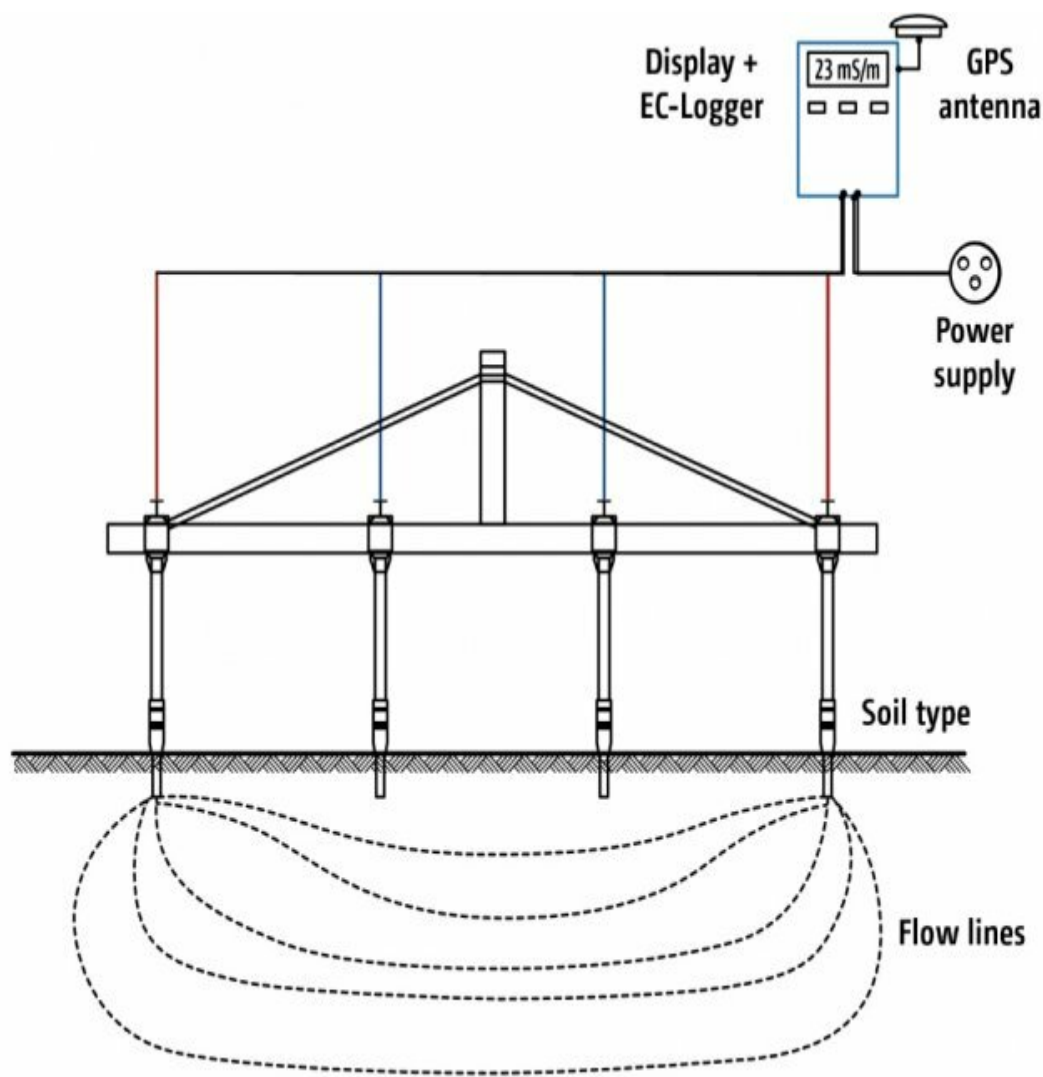
Sensor systems and relevant tractor parameters for SoilDetect

IMAGE SOURCE: AMAZONEN-WERKE H. DREYER SE & Co. KG

Multi-sensor technology as the basis for the SoilDetect system

The AutoTill system (new at Agritechnica 2023) includes various sensor systems for the main segments and processes within the cultivator. In addition to the sensors on the cultivator, the tractor also provides data such as speed, fuel consumption, slip and traction, which is recorded and made available by the project partner exatrek GmbH. The interaction and communication between the tractor and implement takes place

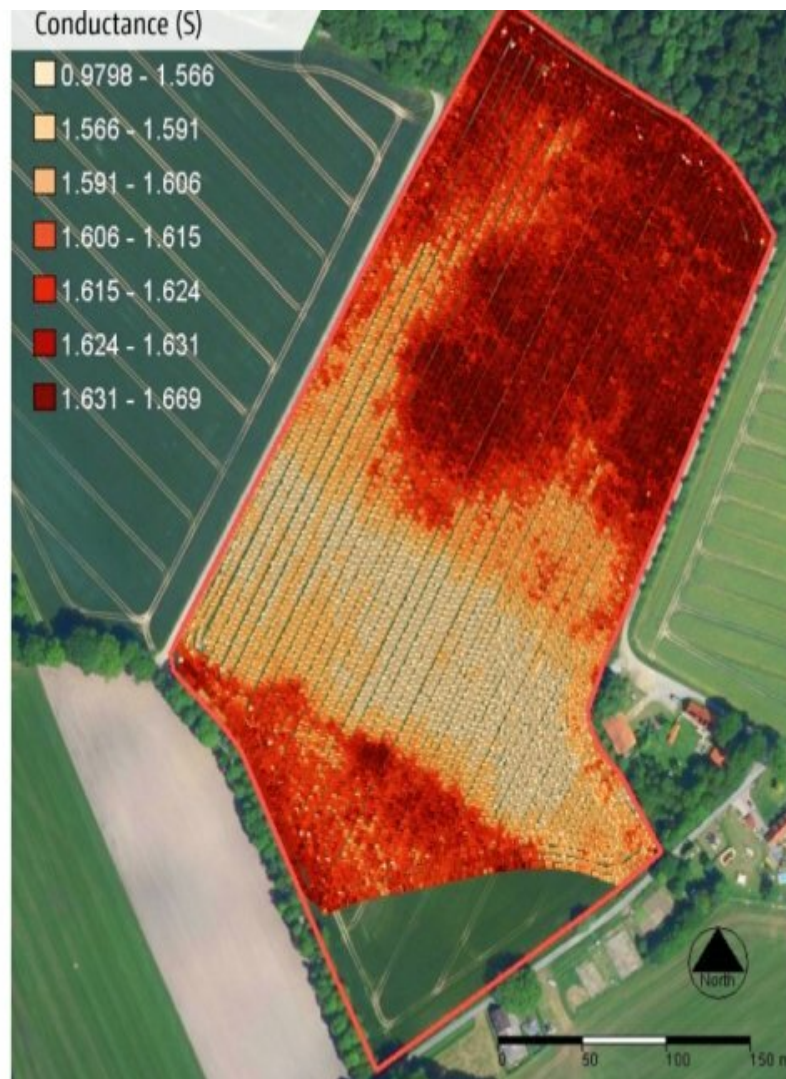
via the ISOBUS interface. With AutoTill, collecting, analysing and using data focuses directly on the work process. During soil tillage with the cultivator in the field, however, even more data can be recorded and collected, which can then support and optimise downstream working. For example, AutoTill provides the sensor systems for SoilDetect, which focuses primarily on geo-electric soil conductivity measurement during operation. The geo-electrics are being developed by project partner Field-Expert GmbH. The data is analysed using AI methods by the project partner Osnabrück University of Applied Sciences.



4-point measuring layout for soil conductivity measurement using SoilDetect

IMAGE SOURCE: AMAZONEN-WERKE H. DREYER SE & Co. KG

Geo-electric measurement takes place during soil tillage and requires no additional resources. The generation of a high-resolution soil map is automated with the help of an expert system with AI support. The time and effort required for generation is significantly reduced, a decisive advantage over current methods.

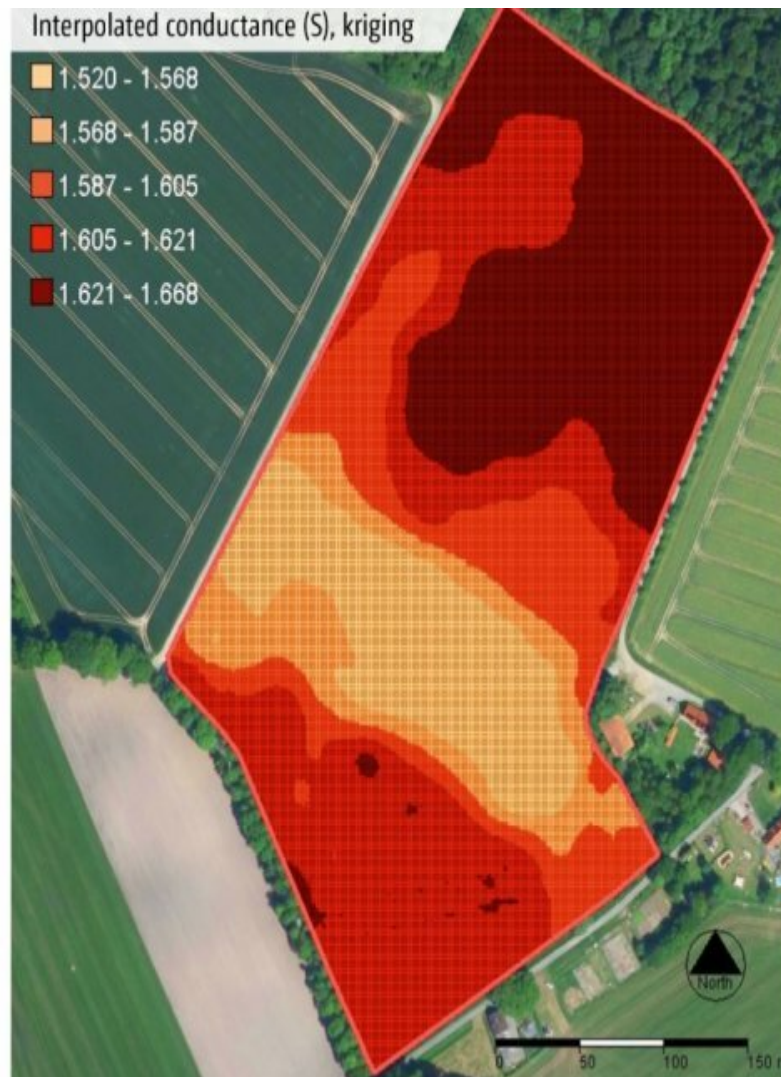


SoilDetect provides the soil conductivity values measured during the pass.

IMAGE SOURCE: AMAZONEN-WERKE H. DREYER SE & Co. KG

The SoilDetect system combines individual AutoTill sensor systems, such as the working depth sensor, overload safety device and position sensor, with geo-electric soil conductivity measurement. To this end, an electric current is directed into the soil via individual tines. The 4-point arrangement is used. Two pairs of electrodes are used for this purpose.

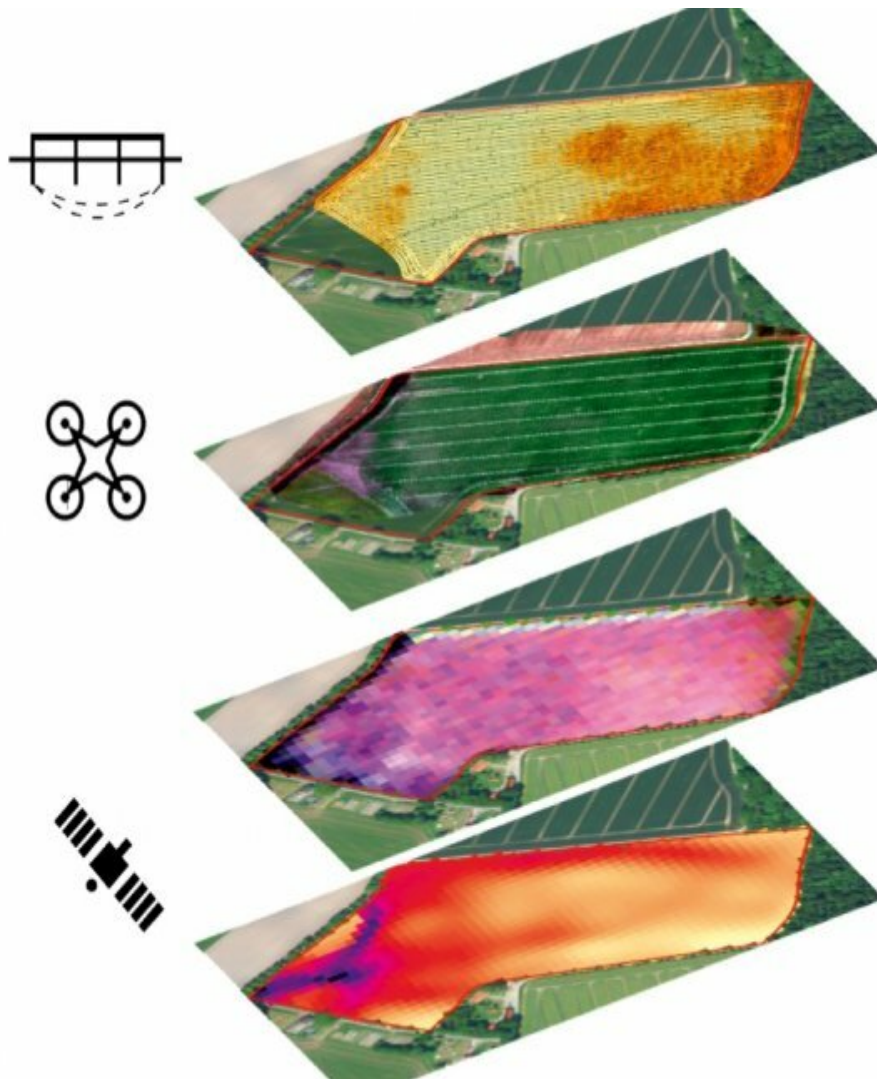
- 1 pair of electrodes for the supply of a constant current (I)
- 1 pair of electrodes for measuring the voltage (U)



Processing of the measured data into interpolated conductance values (S) with classification according to the Jenks method

IMAGE SOURCE: AMAZONEN-WERKE H. DREYER SE & Co. KG

The measuring current (I) is constant. The measuring voltage (U) is measured. Changes in the measured voltage indicate a change in soil conductivity.

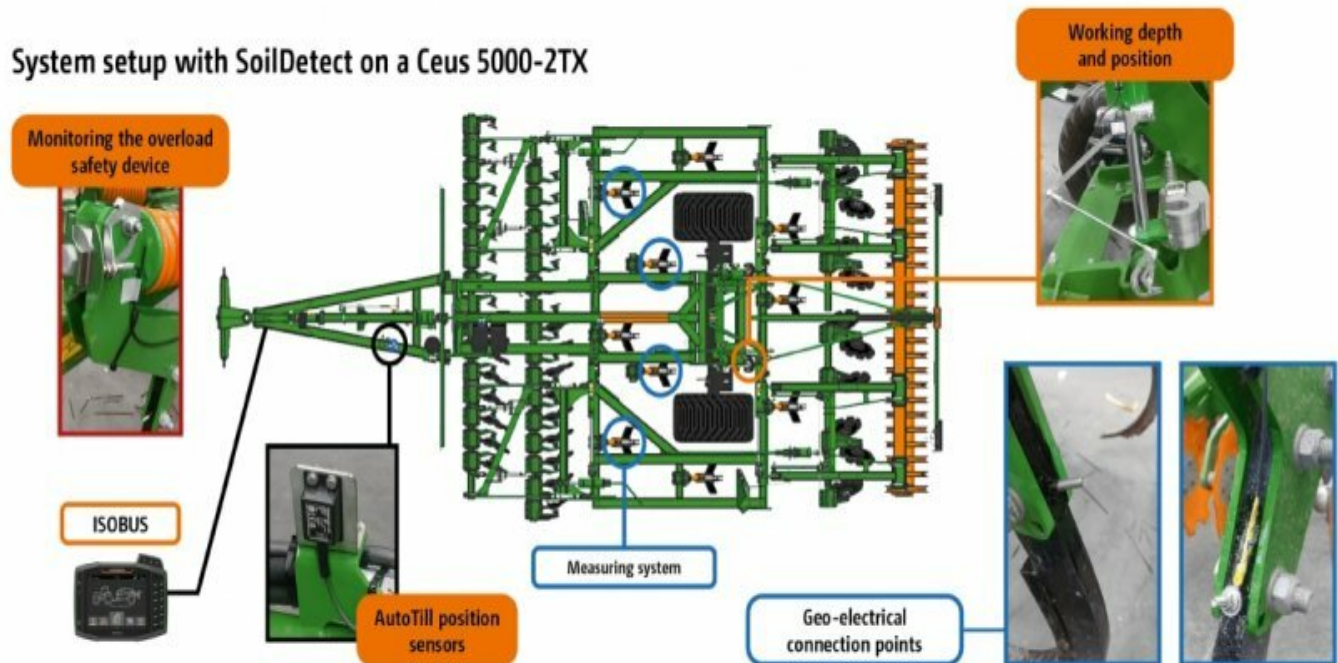


Data fusion: geo-electrical measurement data, soil assessment data and conductivity values (EC values) result in a part-area, site-specific soil map

IMAGE SOURCE: AMAZONEN-WERKE H. DREYER SE & Co. KG

The aim of these measurements by SoilDetect during the cultivation process is to create a database from which a high-resolution soil map can be generated with AI support. This map enables farmers – worldwide – to optimise crop production on a part-area, site-specific basis. Part-areas with yield potential – derived from the values measured by the AutoTill cultivator, the conductivity values combined with the satellite data (NDVI) provided by the project partner JKI – enable optimised fertilisation on a yield and part-area basis.

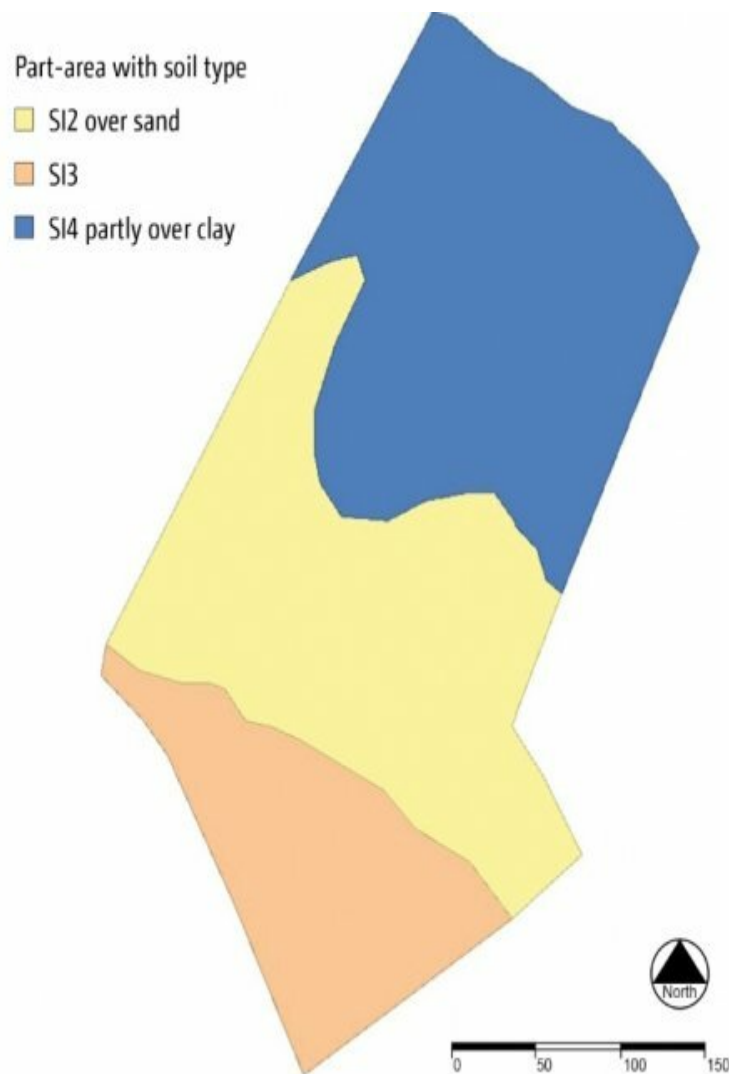
System setup with SoilDetect on a Ceus 5000-2TX



System SoilDetect: combination of AutoTill sensor systems and 4-point geo-electric measurement method for recording the soil condition during soil tillage.

IMAGE SOURCE: AMAZONEN-WERKE H. DREYER SE & Co. KG

After processing the measured data and kriging (interpolation of the conductivity values), interpolated values of the electrical conductivity (EC values) are obtained, classified according to the Jenks method.



Visualisation of the part-area, site-specific soil type after data fusion.

IMAGE SOURCE: AMAZONEN-WERKE H. DREYER SE & Co. KG

In the subsequent step, data is merged from the interpolated conductivity values, satellite data and soil estimate data from the respective agricultural offices.

The content is a constituent part of the joint research project Soil4Climate, with the project partners:



HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

Associated partners:



Westrup



Brunotte

Funded by the BMLEH, funding reference 281D404D22

IMAGE SOURCE: AMAZONEN-WERKE H. DREYER SE & Co. KG

This fusion creates the end product of SoilDetect, namely a site-specific soil map.

With support from



Project manager

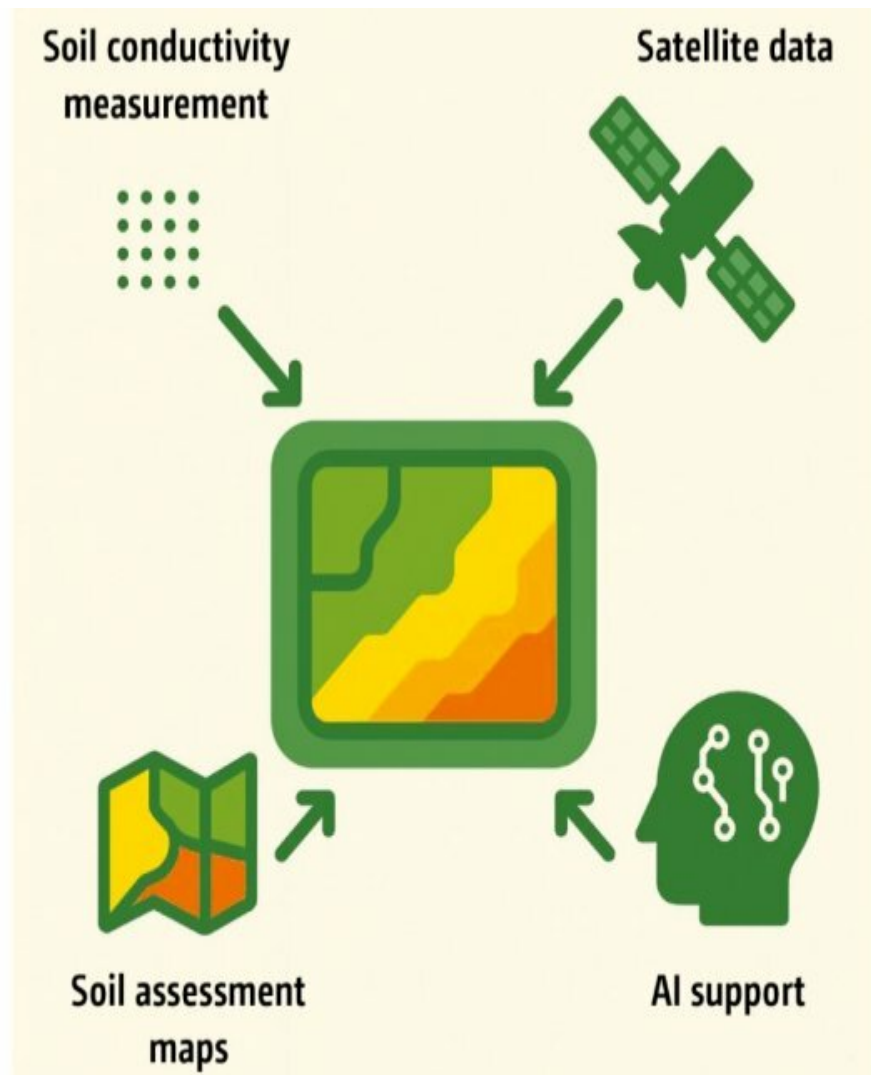


by decision of the
German Bundestag

Funded by the BMLEH, funding reference 281D404D22

IMAGE SOURCE: AMAZONEN-WERKE H. DREYER SE & Co. KG

This enables optimisation of the pH value, fertilisation, sowing and, if necessary, adapted soil tillage on a part-area basis. Part-area, site-specific management has a positive effect on material flow, it promotes the targeted use of resources and may reduce the use of resources on agricultural land. The system allows decentralised use in all agricultural regions of the world.



Scheme for the generation of high-resolution soil yield maps with soil conductivity measurement

IMAGE SOURCE: AMAZONEN-WERKE H. DREYER SE & Co. KG

SoilDetect can be integrated into all cultivators, provided that they are ISOBUS-equipped.

The intelligent connection and networking of implements using the cloud-based data platform AmaConnect opens up new possibilities. This lays the foundation for smart functions focusing on decision-making support, automation, process monitoring and quality assurance.

Expert knowledge is not required to collect data and transmit it to specialists worldwide via AmaConnect to generate yield potential maps. Real-time data, sensor systems and digital assistance systems create more transparency and efficiency in use.

As a result of this data, a high-resolution soil map is made available to the farmer as a basis for decision-making for part-area, site-specific arable farming with the aim of applying resources in a needs-based and

targeted manner. This is how AMAZONE equipment becomes the digital partner for the operational challenges of tomorrow.

Downstream processes that influence growth conditions and water availability can be optimised using SoilDetect.



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- SoilDetect is a system for measuring soil conductivity during the tillage operation
- SoilDetect combines AutoTill sensor systems and 4-point geo-electric measurement via the cultivator tines to determine the conductivity of the soil

- A high-resolution soil map is created from the fusion of data from sensor systems, satellite images (NDVI) and soil assessments with the support of artificial intelligence
- The soil maps generated allow part-area, site-specific cultivation with efficient use of inputs
- SoilDetect also serves to optimise downstream processes, such as improvement in growing conditions and water availability
- With SoilDetect, AMAZONE machinery becomes your intelligent partner on the farm

Source: AMAZONEN-WERKE H. DREYER SE & Co. KG