3rd Newsletter

Decision Support for Optimized Site-Specific Fertilization based on Multi-Source Data and Standardized Tools

Dear reader,
with this newsletter, we would like to give you an overview on the latest achievements of the iFAROS project.

University of Hohenheim experiments: Assessment of Application Accuracy using Machine Data (ISO 11783)

In-field performance of the centrifugal spreader used for site-specific fertilization is of great importance in achieving higher application accuracy, especially when it comes to the map-based variable-rate application (VRA). In this case, by using high accuracy positioning sensors (Fig. 1), modeling the response of the machine to the VRA that defines the accurate applied mass based on the landing position of each fertilizer granule in the field would be a potential solution. Aspects from the recorded ISOBUS data such as the revolutions of the spreading disc, the fertilizer flow rate, and the operation speed, enhance the model performance, in terms of accuracy in the granules in-field position.

Figure 1: *A centrifugal spreader designed with high accuracy positioning sensors for performing VRA.*

Figure 2: *Field experiments in Tänikon, Switzerland.*

Agroscope: Field Experiments

In the framework of the project iFAROS in 2020, Agroscope continued as planned the field experiments on three fields F5, F6, and F7 located in Tänikon, Switzerland (Fig. 2, 3). The aim was to test the use of sensor and soil-based variable rate application (VR) of N fertilizer in comparison to Standard uniform fertilization (ST) carried on in winter wheat in Switzerland. Further details of the experimental sites and the methods used can be found in Argento et al. (2020).

Results of 2020 experiments showed a significant reduction in applied N fertilizer (25-41%) in VR treatments compared to ST treatments over the three fields. The yield was statistically in the same range among all fertilized treatments and around 7 t ha^{-1} (Fig. 4).

Figure 3: *Overview of the three winter wheat fields used for the 2020 experiments. The normalized difference vegetation index (NDVI) is shown as a layer for in-field variability of canopy cover.*

The trend of 10% improvement in nitrogen use efficiency (NUE) observed in the previous two years (Argento et al. 2020) in VR compared to ST was however not confirmed this year due to a generally lower N-uptake in VR compared to ST.

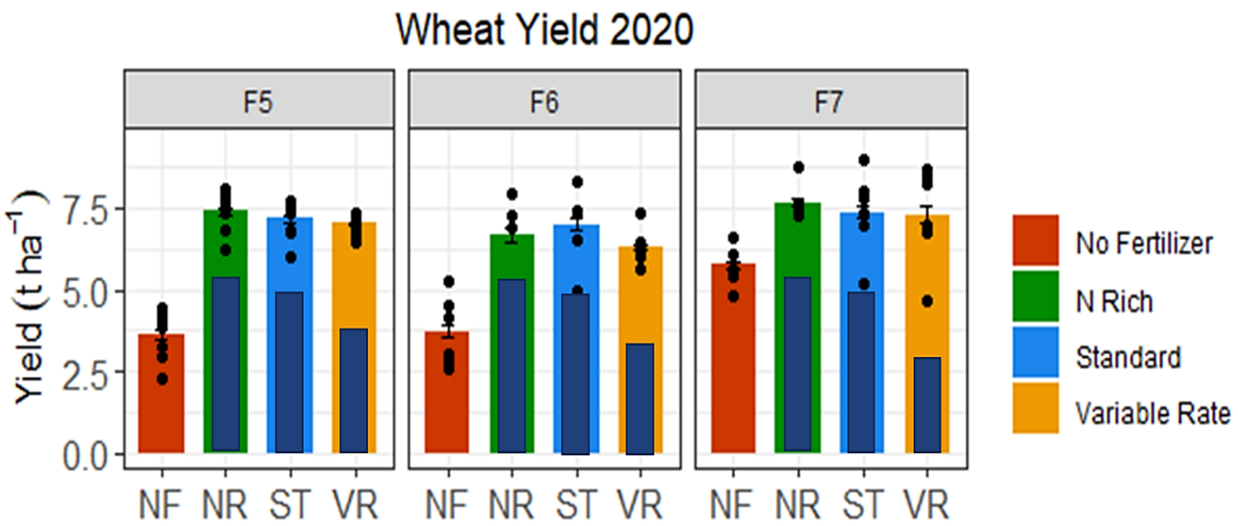

***Figure 4**: Winter wheat yield (t ha^{-1}) in 2020 on the three fields F5, F6, and F7. The color of the bars represents the four different treatments while the additional blue column inside the bars represents the amount of N-fertilizer applied in each treatment. In VR the application was reduced by 25, 33, and 41% compared to ST for F5, F6, and F7, respectively.*

One possible explanation is the prolonged drought in April (32 days), which delayed the second split of N-fertilizer, affecting, therefore, those treatments as VR, which received less fertilizer at the beginning of the season.

To further improve the method developed in the project, the focus is now on the soil and climate data and how their integration into the decision-support system could be beneficial to further improve efficiency.

Agroplanning: New Online FMIS Interface Launched

Agroplanning has launched the brand new online FMIS interface for the iFAROS project.

Main functionalities are:

- Creating and editing farms and fields.
- Vehicle tracking and real-time visualization.
- Loading datasets directly from vehicles, connecting to Sentinel API and retrieving NDVI information, importing CSV and SHP files.
- 2D and 3D visualization.
- Tools to analyze the data sets, by using statistics calculations and different types of charts.
- Generating maps using interpolation methods and statistics data filtering, directly from the vehicle data or any imported file.
- Improving map understanding by using data clustering and generating zonification maps.
- Making multilayers calculations creating own formulas and combining different sources of information in own way.
- Using BigData technology to automatically analyze and find correlations between different data sources and productivity.
- Creating prescription maps based on own calculations.

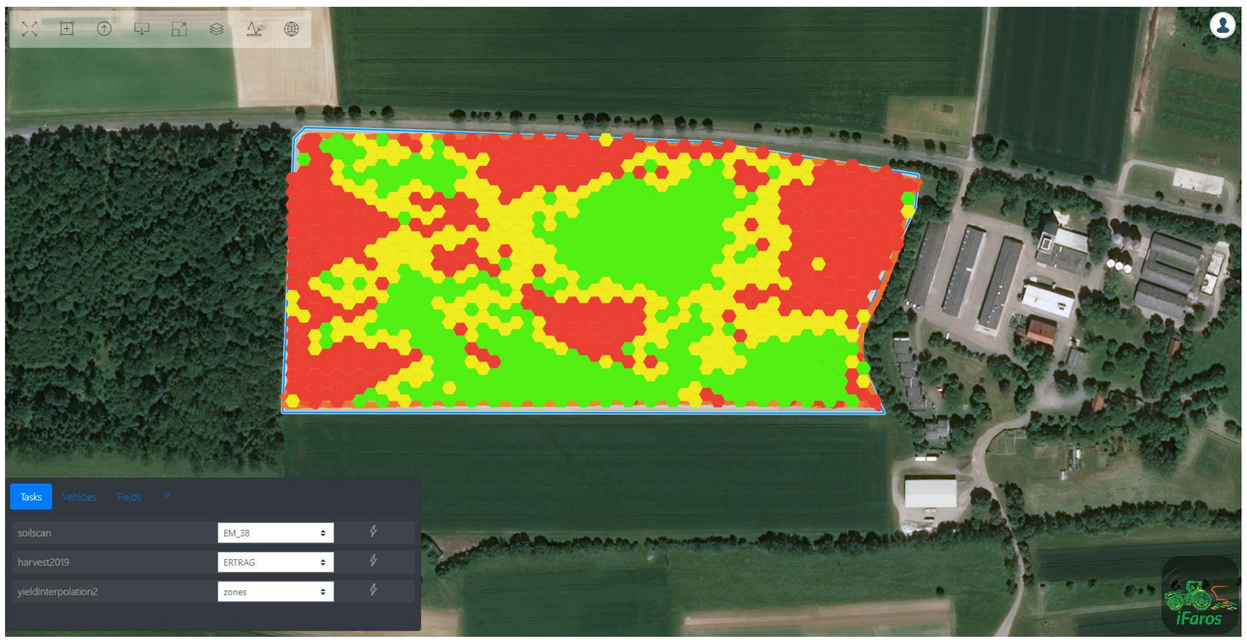

***Figure 5:** Making three statistical different zones from yield data.*

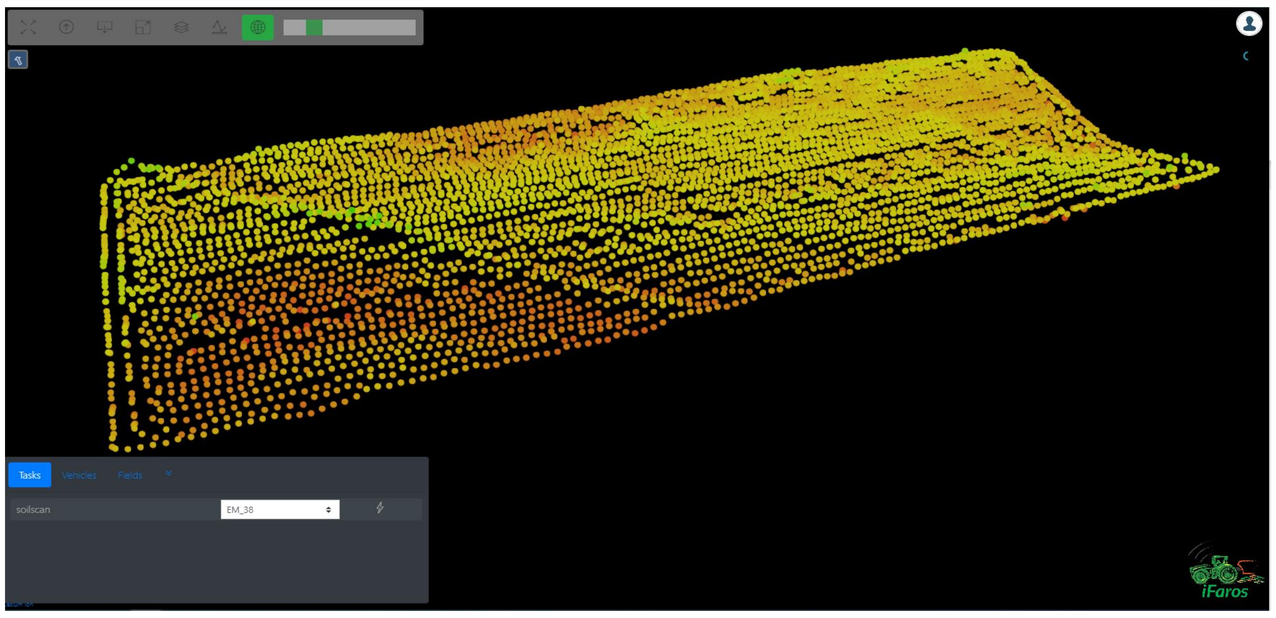

***Figure 6:** Raw EM38 data (Soil ECA) on 3D view.*

DISY: Improved Data Pre-processing and Analytics

DISY has been working on implementing the required web service and improve the data preprocessing as well as automated analysis. The new approach increases the amount of data available for analysis by only filtering erroneous data locally.

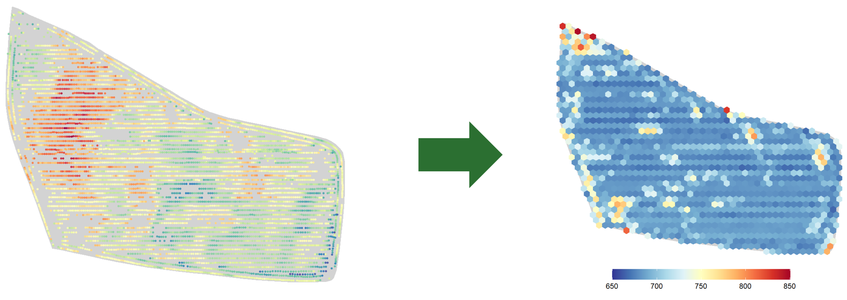

***Figure 7a:** Improved pre-processing and resulting hotspot analysis.*

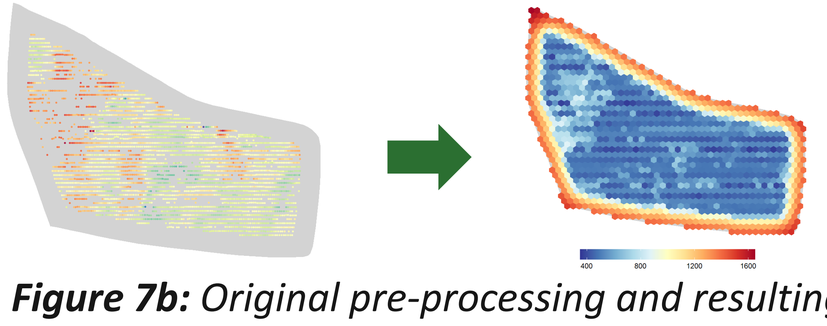

***Figure 7b:** Original pre-processing and resulting hotspot analysis.*

Latest Events

Dr. Julian Bruns and M.Sc. Oliver Hennhöfer presented the latest results regarding geospatial intelligence from iFAROS at the AGIT-2020. The conference took place virtually from 06.07. to 10.07.2020.

Tetiana Pavlenko has presented the latest results from the iFAROS project at the International Conference on Information and Communication Technologies in Agriculture, Food & Environment (HAITCA 2020). The abstract could be found at http://ceur-ws.org/Vol-2761/ in Session 2: Precision Agriculture.

PD Dr. Dimitrios S. Paraforos presented the iFAROS at the TUM HEF Symposium dedicated to Digital Agriculture - Networking and Interaction. The event took place virtually on 29. October.

Stay in contact

We will be happy to see you at our Twitter account: @IfarosP.
Should you have any questions or want to share any news with us, please get in contact with the coordination team:

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