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Press Release /// Pressemitteilung

Back to the Future – Remote Sensing for Precision Farming

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Precision farming for yield mapping has raised modern agriculture to a new level. A greater use of drone, sensor and information technology, aimed at precision cultivation via yield mapping, is the next major step now.

The Jülich Research Centre, one of the largest European institutes in the domain of biological and geological sciences. About 150 scientists are searching for a future food solution there to comply with challenging climate changes and population growth: UAV-based Precision farming for efficiency and effectiveness in agriculture. For that purpose they explore UAV based agricultural research to observe plants below ground, at the bottom and – with help of the AscTec Falcon 8 – from above. After scores of laboratory tests the results must stand the test in practical use growing on agricultural fields under real conditions. High tech drone and specific sensors will provide data and frequently document progress. Those data make reliable analysis possible and proof laboratory research results to be true or false.

Here the patented octocopter AscTec Falcon 8 plays an important role delivering the required georeferenced information about vegetation and moisture loss, crop rotation, irrigation, soil science and weed or pest. Precise amounts of fertilizer and pesticides could offer particular scopes of savings and prevent nutrient accumulation. So the question is, if the application of drone and sensor technology is an useful precision farming tool or still future vision merely.

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Andreas Burkart “had been working intensively with the AscTec Falcon for 3 years” testing diverse special sensors to explore it both nationally and internationally. Due to the “combination of drone and sensor” the innovative concept proved successful.

Precision farming with drone and sensor

There are three scientific publications, which document the outcome of that research. Read the research findings about the use of professional drones and multi- and hyperspectral sensors in agriculture.

- **Deploying four optical UAV-based sensors over grassland: challenges and limitations.** – Unmanned aerial vehicles (UAVs) equipped with lightweight spectral sensors facilitate non-destructive, nearreal-time vegetation analysis: Download.
- **Angular Dependency of Hyperspectral Measurements over Wheat Characterized by a Novel UAV Based Goniometer.** In this study the researchers explore the use of a hyperspectral flying goniometer system, based on a rotary-wing unmanned aerial vehicle (UAV) equipped with a spectrometer mounted on an active gimbal. Download.
- **A novel UAV-based ultra-light weight spectrometer for field spectroscopy.** – Field spectroscopy as well as hyperspectral remote sensing (RS) are common techniques to gain an insight on land cover beyond the human eye. In this case: A novel hyperspectral measurement system for UAVs in the VIS/NIR range (350-800 nm) was developed based on the Ocean Optics STS microspectrometer. Download.

With diverse cameras and sensors the scientists receive essential information. Indeed “multispectral and hyperspectral UAV sensors become ever more relevant” says Burkart. Mounted on the AscTec

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Falcon 8 sensors like a digital Sony NEX-5N for RGB information, a Canon PowerShot infrared camera and a UAV STS spectrometer have been tested. Another useful sensor was a MCA6 multispectral camera.

and watch the natural cover in HD. A NEC F30 thermal camera provides thermal images to explore moisture loss for instance.

“I was glad working with the AscTec Falcon 8 and say thank you for that opportunity and professional support. The reliable flying sensor platform enabled exciting research and lots of fun at work.” Andreas Burkart, Doctoral Candidate, Jülich Research Centre.

The aim of conventional precision farming is to identify differences in vegetation, growth, nitrogen supply, soil properties and yield capacity between areas within a field and to respond accordingly with requirements. The vision is to achieve better nutrient distribution within a field and to apply the optimum level for each single site. Nothing but the precise amount required by the crop at that site is applied. This would increase yields and save fertilizers and pesticides. In addition protecting the environment by preventing nutrient accumulation. Thus by drone you can gain additional valuable data for enlightening analysis.

Precision farming versus uniform agricultural cultivation

In most regions today farms are still organized in large uniform crop plots. Therefore there is no consideration of the application of fertilizer and pesticides on the different areas of with a plot. Within one plot of land there are differences between the build-up of soils and growth rates of plants, hence leading to subdivisions within one plot. This is ecologically and economically disadvantageous, evident through the unbalanced distribution of nitrogen, strong variation in yield and quality. The remedy is: Precision farming to carefully cater to each section of a plot. Useful data can be collected, analysed and compared with the help of latest drone and sensor technology very efficient.

We say thanks to Andreas Burkart and involved researchers, institutes and sponsors – like IEEE Sensors Council, Jülich Research Centre (Institute of Bio- and Geosciences, IBG-2, Plant Sciences), University of Valencia (Laboratory of Image Processing), University of Cologne (Department of Geography, Remote Sensing Research Group), University of Bonn (Center for Remote Sensing for Land Surfaces & Department of Geoscience, Working Group GIS and Remote Sensing), Massey University New Zealand (Institute of Agriculture & Environment) and University of Zurich (Remote Sensing Laboratories) for the opportunity to share.

Tags: UAV for Agriculture & Environment, UAV for Crop Sciences, UAV for Precision Farming Category: Ascending Technologies, AscTec Falcon 8, AscTec Professional Line, UAV for Agriculture & Crop Sciences