How Farmer Can Utilize Drone Mapping?

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SUMMARY

During the last few years, drone technology (alternative names: UAV; Unmanned Aerial Vehicle or RPAS; Remotely Piloted Aircraft Systems) has evolved tremendously. At the same time, the spectral and thermal sensors weight has decreased to a level of 500 - 1000 g, allowing their use in small drones. This provides completely new possibilities to carry out high resolution remote sensing of the environment. Agriculture is one of the most promising applications of the UAV imaging. Traditional RGB cameras can already provide valuable information about the state of the environment. For example, a farmer can have a quick general view of the crop condition. In addition, almost automated service chains are available, utilizing this technology for farmers (www.dronedeploy.com). However, the improved availability of drone systems with spectral sensors enables even more possibilities of the technology practical use. In this case, farmers can plan crop management and input use (e.g. nutrient application and crop protection) depending on yield capacity. Although many demonstrations with drone mapping have shown the potential of the technology, the usability of the service is still a critical aspect to be incorporated in farmers every days use.

In the context of EU-LIFE Climate Change Mitigation Project "Optimising Agricultural Land Use to Mitigate Climate Change" (OPAL-Life; www.opal.fi) we are investigating feasibility of drones in aiding farmers in optimizing their land use and farming practices. We carried out 34 flights with drones for 16 different agricultural field parcels during summer 2016, in real farms in Finland. The same parcels were measured by drones several times during the summer to acquire multitemporal data during different phases of the growing season. We used in each flight a low-cost RGB camera and a hyperspectral sensor, and eventually also a thermal camera were used. The collected data covered different plants such as grass, wheat, barley, oat, rapeseed and pea. The spatial resolution of data is high, for example 4 cm for RGB and 15 cm for spectral sensor, when using flying height of

140 m. 3D-pointclouds, digital surface models, RGB orthomosaics, hyperspectral reflectance mosaics and various vegetation indices maps were generated from the data collected. Using the data, analysis of the vegetation status and growing will be studied. Based on these experiences, the aim of this work is to study the potential of novel drone based technologies in precision farming and to show for farmers practical examples on how to utilize novel drone mapping technologies in agriculture.