Tool Factsheet

Drones for agriculture and nature monitoring

Which plant traits do vegetation types and crops have in a specific region?

How are the plant (crops) developing?

What changes in vegetation are taking place on a short term under influence of management or a lack of management or natural events?

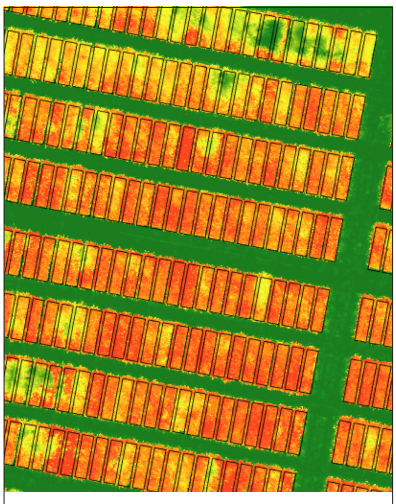
How should farmers adapt their within field management practices (task maps for precision farming)?

How many animals do we encounter in a region?

These are all examples of questions that can be answered by using information collected by drones.

Drones are unmanned airborne vehicles (UAVs) that are able to collect spatial information by flying over a specific area. The spatial information obtained is determined by the type of camera, which can be multi-spectral, hyperspectral, thermal or 3D Laser scanning. This implies that within a very short period of time very detailed spatial information can be collected, which can be easily used to answer questions of the end-users as the examples above.

The drones can collect information with a few centimetre resolution which enables us to characterize individual objects, like all single plants or trees. The large amount of information can then be processed by computers into indicators at the field or landscape level that are useful for the end-user.



Crop height (m)

PLOT-ID	MIN	MAX	RANGE	MEAN	STD	SUM
1	0.00	0.96	0.96	0.41	0.37	220.26
2	0.00	0.54	0.54	0.04	0.14	23.71
3	0.00	1.89	1.89	0.17	0.44	89.20
4	0.00	1.21	1.21	0.02	0.09	12.03
5	0.00	2.02	2.02	0.27	0.51	141.72
6	0.00	1.98	1.98	0.19	0.35	100.59
7	0.00	0.68	0.68	0.18	0.21	99.00
8	0.00	0.76	0.76	0.31	0.27	163.62
9	0.00	0.71	0.71	0.31	0.23	162.50
10	0.00	0.70	0.70	0.27	0.22	147.45
11	0.00	1.37	1.37	0.20	0.24	105.35
12	0.00	2.65	2.65	0.37	0.57	188.08
13	0.00	2.53	2.53	0.64	0.74	316.52
14	0.00	0.99	0.99	0.41	0.37	214.92
15	0.00	0.99	0.99	0.55	0.37	287.65
16	0.00	1.01	1.01	0.51	0.38	258.61

Statistics per experimental plot: Crop height derived from LiDAR point cloud on a 10 cm grid

Keywords

drones, UAVs, centimetre resolution, flexibility, plant traits, surveying, monitoring

Why would I choose this approach?

You only do this when you need information at a centimetre to decimetre resolution that cannot be obtained from satellites. So it mostly concerns detailed and up-to-date information for a relatively small area, like an agriculture field or nature area or forest. Information can obtained for plant biomass, height, chlorophyll content etc.

What are the main advantages?

Next to the very high resolution, you can fly on the most ideal time of the day and with a high time frequency. No cloud constraints as is the case for satellites. It also enables the collection of unique information according to the required standards, e.g. confidential information for plant breeders.

What are the constraints/limitations?

- Drones can so far only acquire imagery for a limited area (no further than 500 meter distance and 120 meter height). Procedures for Extended VLOS or Beyond VLOS (Visual Line of Sight) flying are in development and will make it easier to record larger areas.
- Use of drones is relatively expensive compared to satellite imagery in terms of costs per ha, but it provides much more detailed information according to the required standards.
- Flying restrictions in countries can constraint the use drones for specific areas.
- Weather conditions constraints: no rain and windspeed < 8 m/s (beaufort 5)

How do I apply the approach?

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Where do I go for more information?

www.wur.eu/uarsf