



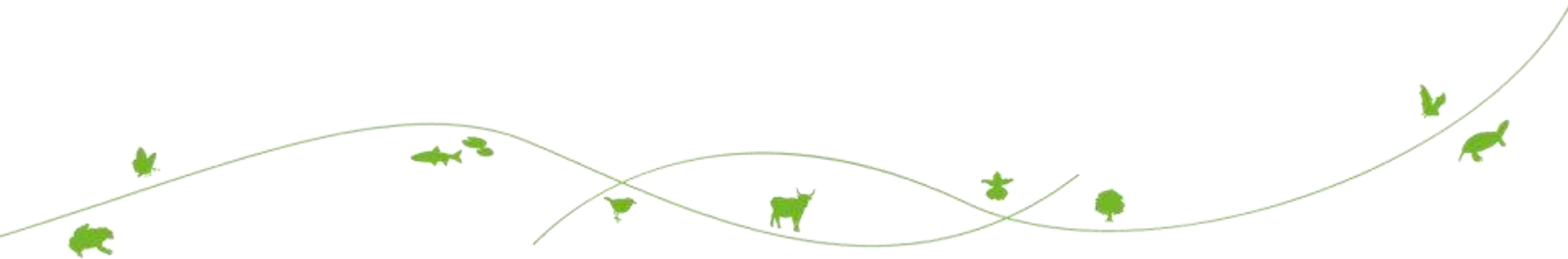
Using drones to map terrestrial and aquatic ecosystems

ALPARC conference

Unmanned Aircraft Systems in protected areas: opportunities and threats

27 and 28 th March 2018

Carole Birck



Method 1 : Evolution of a river delta

Aim of the protocol

- Monitor land-cover changes due to the mouvement of the river in the delta
- Map the position of small islands in the river system and provide information about the land-cover.

Method of the initial protocol

- We do vegetation surveys which use a combination of point intercepts and vegetation transects to better characterize community composition and structure across a gradient.
- We describe vegetation height, spatial distribution of plant species in order to assess changes in vegetation through time.
- We also use aerial imagery from satellites to place the different islands in the delta.



Method 1: Evolution of a river delta



Inconvenience of the initial protocol

Requirements :

- boat and paddle
- Waders
- Gps
- Satellite imagery
- Three people

Difficulties :

- ✓ Dangerous for the ranger to cross the river with a very unstable little boat
- ✓ To record data on board
- ✓ To repeat the same path each time.
- ✓ The survey provides information only on the point of the transect
- ✓ Limitation of satellite imagery due to cloud cover. We cannot have the aeriels pictures when we want, it depends of the passage of the satellite above our area.

Method 2 : Evolution of a river delta

- We decided to test drone in place of terrestrial protocol.

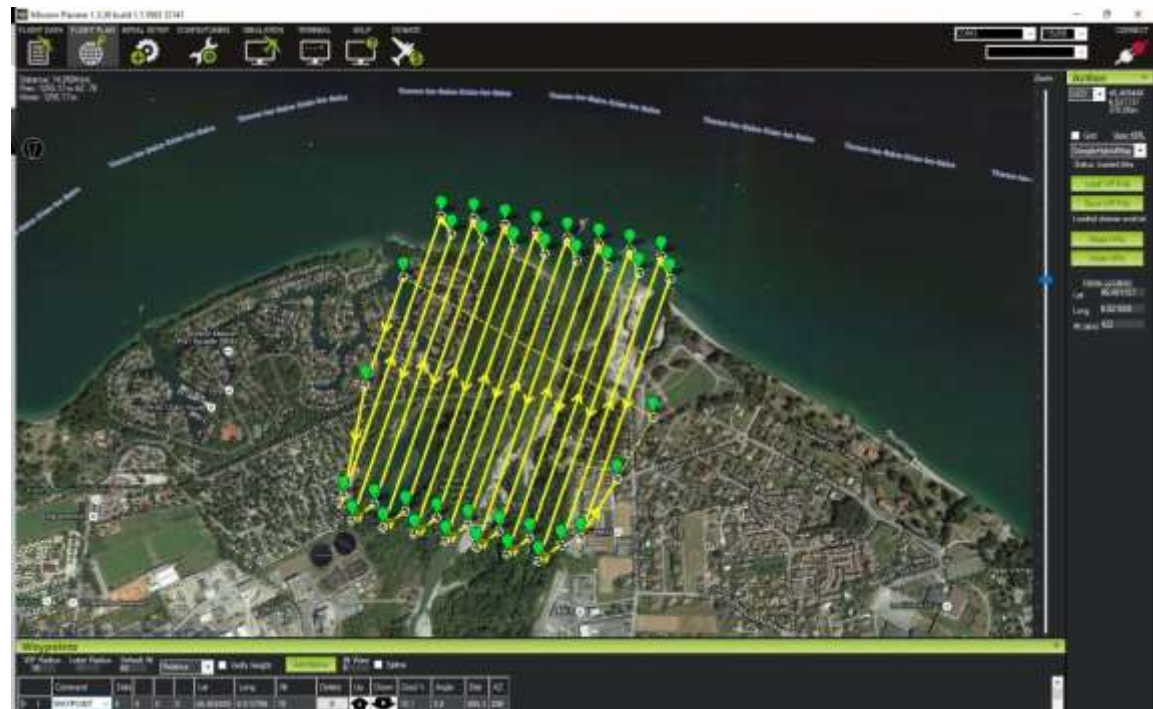
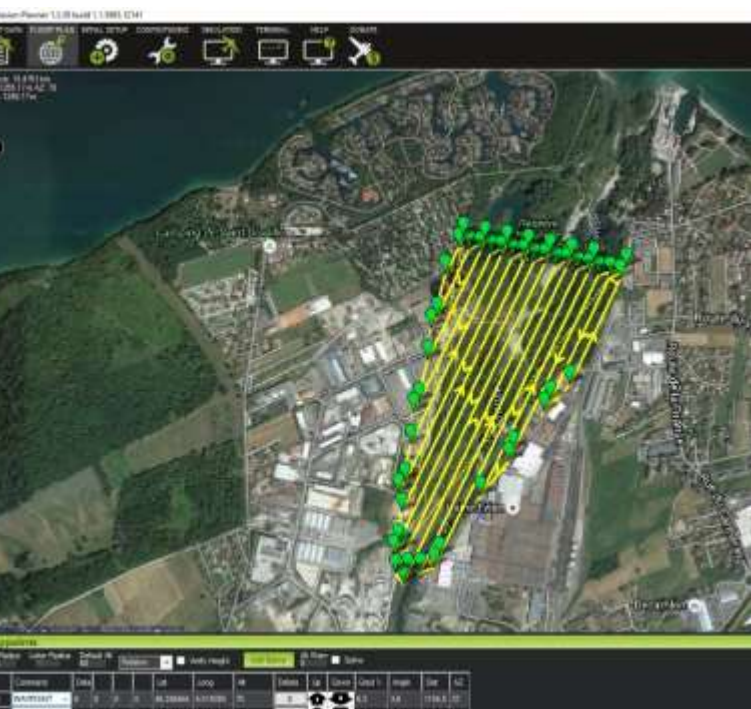
The choice of the material

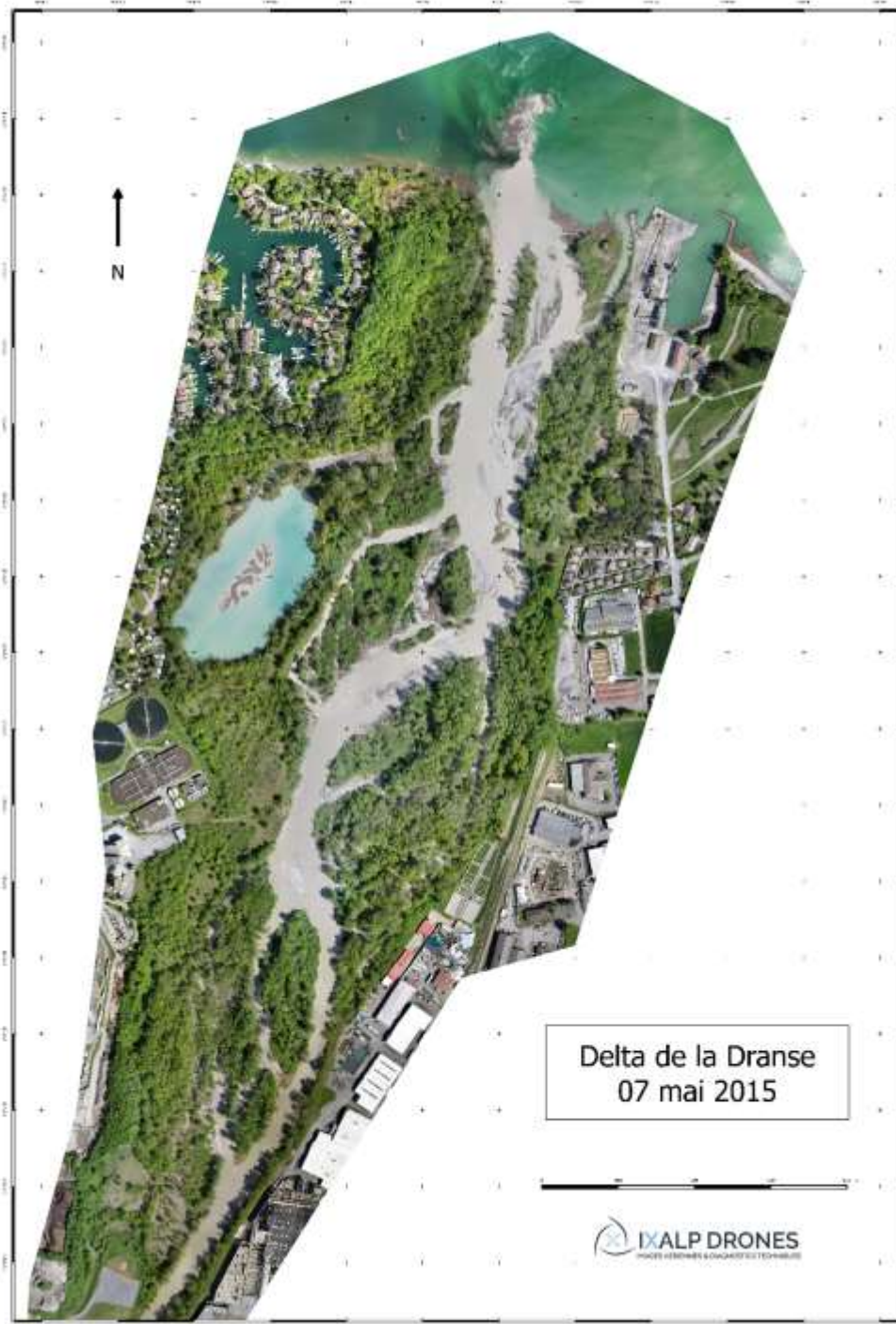
- Fixed wing UAVs allows users to map larger areas in single autonomous flight. The wing can cover more surfaces in just one flight than a multicopter, rotary drones systems are best suited for charting smaller areas.
- The fixed wing sounds quieter than the multicopter.
- The wingspan is 1 meter long and the radio link range is 3 km.
- The drone flew 50 meters above the ground



Method

- We need two flights of 20 minutes to take pictures of 55 hectares.
- + Manuel photointerpretation takes 2 days





Advantages

- ✓ UAV produces completely up-to-date imagery of the reserve.
- ✓ Efficient : Using the UAV for this case is fast and requires minimal staff
- ✓ Using an aerial approach overcomes common site access issues such as impenetrable vegetation.

Disadvantages

- ✓ We need to be aware of birds on the site, it's necessary to do the flight out of breeding period.
 - ✓ The wing model is bird-shaped and can be attack by a real bird of pray.
 - ✓ It's necessary to have a flat site to land the UAV
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- ✓ The use of UAVs can bridge the gap between cumbersome field work and coarse resolution satellite imagery.



Protocol with drone

- ✓ The glacier is surveyed using a quadricopter DJI Phantom 4 pro+.
- ✓ We do 4 flights between 5 to 10 minutes.
- ✓ The drone captures high resolution imagery and by using photogrammetric methods these images can be used to generate a digital elevation model (DEM) and orthophoto mosaic.













Glacial dynamics : Ruan Glacier



Glacial dynamics : Ruan Glacier

- ✓ Today, we use a GPS and we follow the outlines of the glacier by walking along the edge which can sometimes be dangerous (**crevasse...**).
- So we want to use a drone for this protocol.



- ✓ It allows scientists to reach places that were previously off limits as they were either too remote, too dangerous or too time consuming to explore.
- ✓ We can cover large areas of ground in great detail from a completely different perspective and quickly too.
- ✓ It could be contradictory with the preservation of the tranquility of these untouched protected areas.
- ✓ **It's a compromise between protection and knowledge ...**



Thanks for your attention

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