Use of drones in the Swiss National Park (SNP)

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Content

- Why buying a drone?
- Internal organization/handling
- What do we do? (examples, experiences)
Legal situation in the SNP

- Ban on flying for drones
- Visible on the official maps as no-fly zones (wildlife reserves)
- SNP may allow exceptions

[https://map.geo.admin.ch]

-> Restrictions for drones

UAS in protected areas, Dobbiaco, 27.0
Why buying a drone? – Background

• Long GIS tradition in the SNP:
  20 years ago: ~ two-year, expensive project to get own aerial images

• Drone: possibility to capture spatial data ourselves
  – Cost-efficient & fast
  – E.g. debris flow (see later)
Why buying a drone? – Background

• Increasing demand in research projects. E.g. field work season 2016: 3 drone field campaigns with external research institutions 2 of them with eagle attacks (1 slightly damaged, 1 crash landing)
Why buying a drone?

• After field work season 2016: decision to buy our own drone
  – Full control of flying where, when, and how (as ecological as possible)
  – Building up our own knowledge

• Inhouse-knowhow: not dependent on external expertise
  (or assertions about what is (not) possible)

• Control over research (internal & external)

• Allows monitoring
Requirements and in situ conditions determine the type

• Capabilities of the drone
  – Payload? (RGB, video, thermal, multispectral, …)
  – Investment? (Drone, payload, software, hardware, knowhow)

• Considering topographical conditions
  – Forest
  – Valleys
  – Ridges
  – Rock faces
  – Ground (grass, soil, rocks, …)
  – Slopes
Requirements and in situ conditions determine the type

- Specific challenges in the SNP
  - Take-off and landing site
  - Wind
  - Temperature
  - Study areas up to 2’700 m a.s.l. (and potentially higher)
  - Different flying altitudes depending on drone position (slopes)
Starting / landing procedure

• Video
SNP-internal handling

• Everything inhouse
  – Flight planning
  – Drone hardware
    • Robust carrying case (car necessary)
    • Backpack: 1-person solution
  – Work station for processing of data
  – 3 officially qualified pilots, but also inclusion of e.g. students

• Discussion in the team (including rangers) about where and when (acceptance!)
Examples and experiences

- Planning
- Orthophoto, elevation models, and derived products
- Thermal inspection
Planning challenges: slopes

- ~ constant altitude above ground (ca 45m)
- High image overlap in direction of slope! (better here)
- -> Monitoring of gully
Gully above «Cluozza» lodge, 29.09.2017

- Result: orthophoto, DTM, DSM
- Monitoring
Example: Debris flow «Val Minger» (2017)

- Fast: orthophoto, DTM
River «Spöl»

- Initially: aerial images for MSc in river morphology of short section
- Technical accident during river dam renovation (outside SNP, upstream)
  -> PCB-contaminated (PCB: polychlorinated biphenyls)
- Demand for highly accurate data as planning basis, ~5km river length
Planning challenges: valleys

- Narrow, curvy
- Short flight sections
Planning challenges: valleys
River «Spöl»: Products

- Orthophoto
River «Spöl»: Products

- Digital elevation models (DSM, DTM)
River «Spöl»: Derived products

- Vegetation map: derived from DTM, DSM, and orthophoto
River «Spöl»: Derived products

- Modeling of water hydraulic system (inputs: DTM, DSM, vegetation, river bed roughness, simulations for 10, 30, and 40 m³/s)
River «Spöl»: Derived products

- Output hydraulic modeling
Thermal images

- Detection of thermal micro-habitats in high altitudes and impact on the vegetation
- Several flights under different conditions (time, weather, season)
- Fix installed terrestrial camera (thermal), every 30 min
- Temperature loggers on and in the ground
- Project «under development»…
Side product: search flight for fawn of roe deer before mowing

- Requested from gamekeepers
- Early morning
- Media-effective
Special thanks to:
Christian Rossi
Ruedi Haller

Photos
Hans Lozza
Virginia Ruiz-Villanueva
ZHAW, GIUZ
Ruedi Haller
Christian Rossi
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UAS in protected areas, Dobbiaco, 27.03.2018