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)

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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

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

In collaboration with the cantons

Search for a place or add a map:

Q Restrictions for drones

Legend

No-fly zone (5km from the runway)
Limited no-fly zone (150 m above the ground)
No-fly zone (Wildlife reserves)
No-fly zone (other permanent restrictions based on federal law)

▶ Geocatalog   Change topic

▼ Maps displayed

☒ ☑ Restrictions for drones   ⚙

☒ ☐ Hiking trails

☒ ☐ Public transport

☒ ☐ Register of Buil

☒ ☐ Journey through

Looking

[https://map.geo.admin.ch]
-> Restrictions for drones

Object information   🖶 – ✕

Restricted zones for model aircraft and drones (Federal Office of Civil Aviation (FOCA))

Designation	Swiss National Park
Restriction	The nature in the reserve is protected against any human intrusions (and therefore also against the use of unmanned aircraft).
Granting authority	The Federal National Park Commission can authorise the use of drones.
Further information:	Authorisation

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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)

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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)

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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

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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

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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)

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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!)

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Examples and experiences

- Planning

- Orthophoto, elevation models, and derived products

- Thermal inspection

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Planning challenges: slopes

- ~ constant altitude above ground (ca 45m)
- High image overlap in direction of slope! (be
- -> Monitoring of gully

ca. 1900m

ca. 2250m

Chamanna Cluozza

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Gully above «Cluozza» lodge, 29.09.2017

- Result: orthophoto, DTM, DSM
- Monitoring

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Example: Debris flow «Val Mingèr» (2017)

- Fast: orthophoto, DTM

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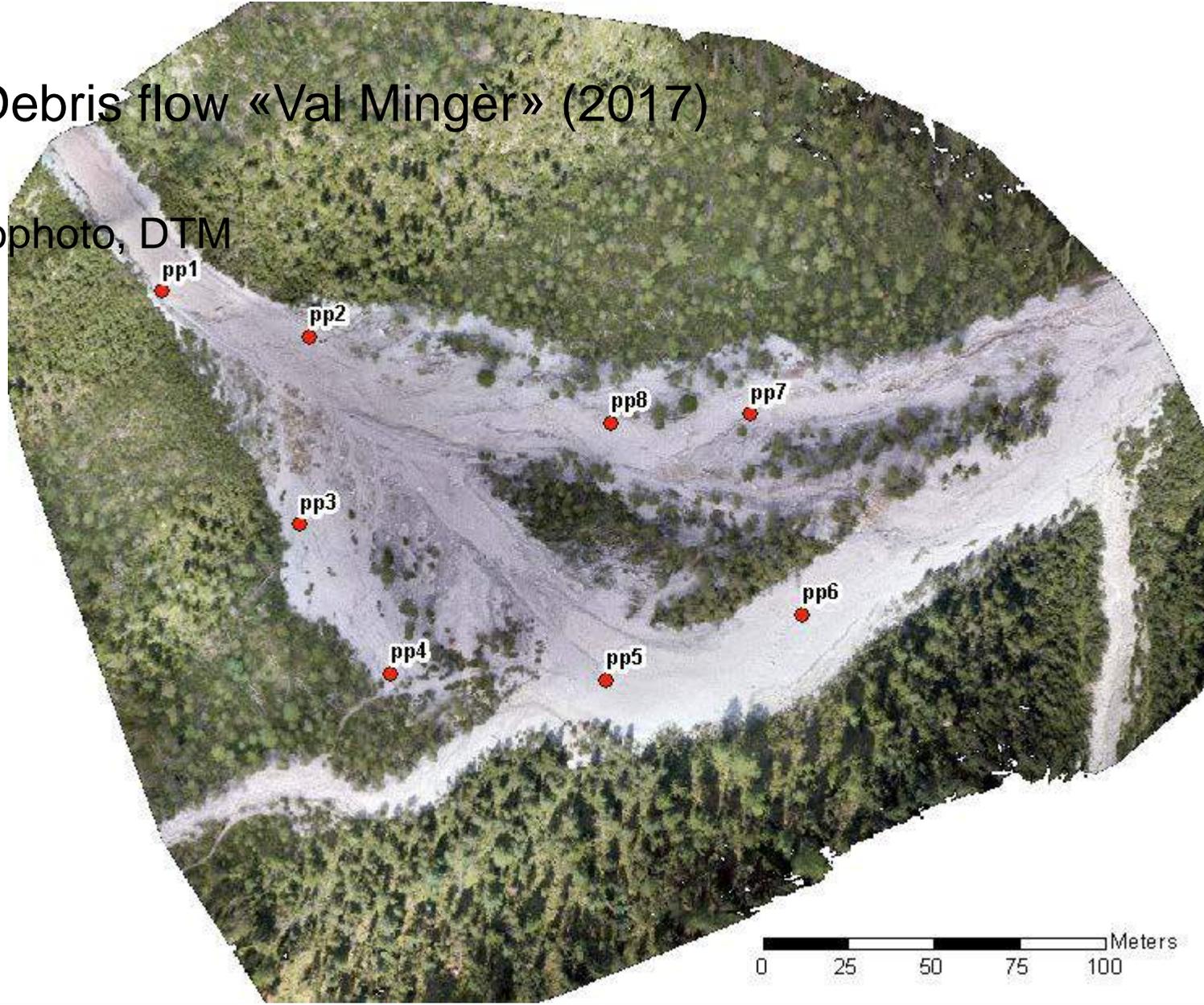
River «Spöl»

- 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

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Planning challenges: valleys

- Narrow, curvy
- Short flight sections

Planning challenges: valleys

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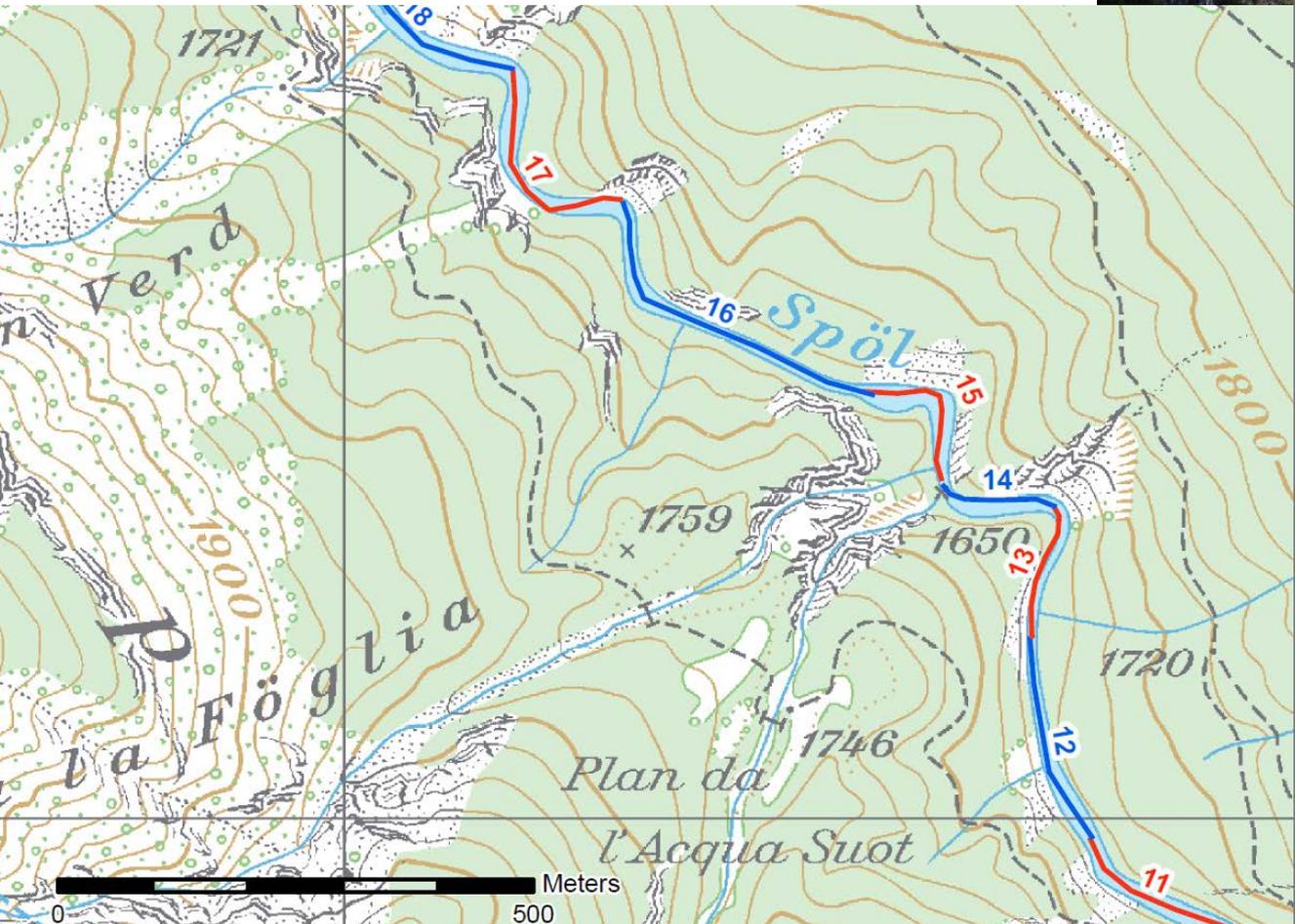
River «Spöl»: Products

- Orthophoto

River «Spöl»: Products

- Digital elevation models (DSM, DTM)

Digital Surface Model (A - A)


Digital Terrain Model (A - A)

Orthophoto:

Longitudinal Section 3D
PCB Measurements
PCB Measurements SNP

N

0   250   500 m

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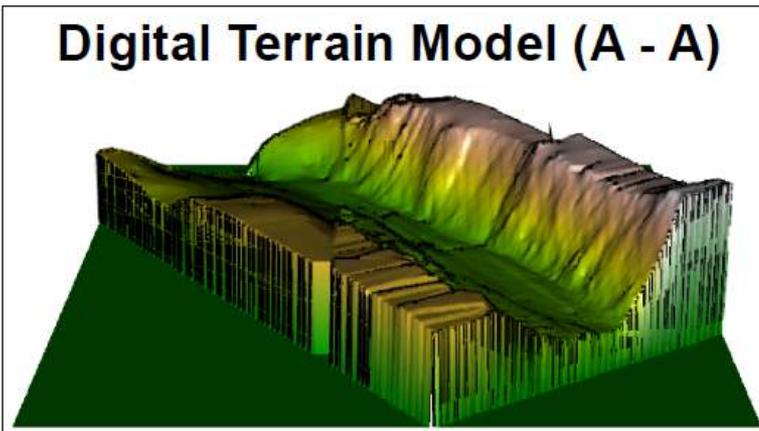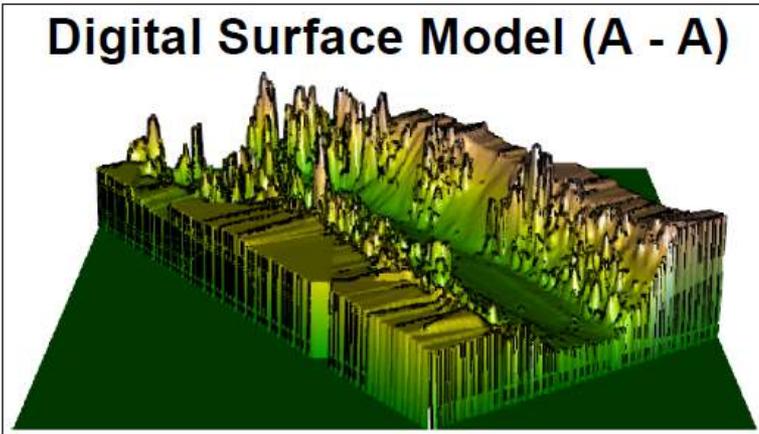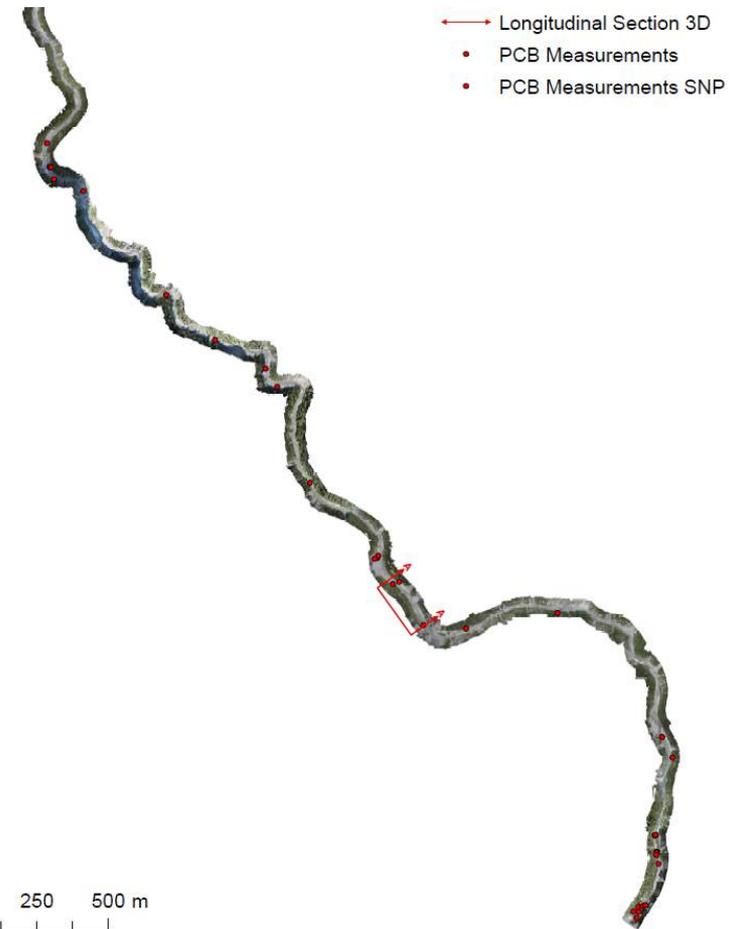
River «Spöl»: Derived products

- Vegetation map:
  derived from DTM, DSM, and
  orthophoto

Vegetation Classification

No Vegetation
Vegetation

N

0   50   100 m

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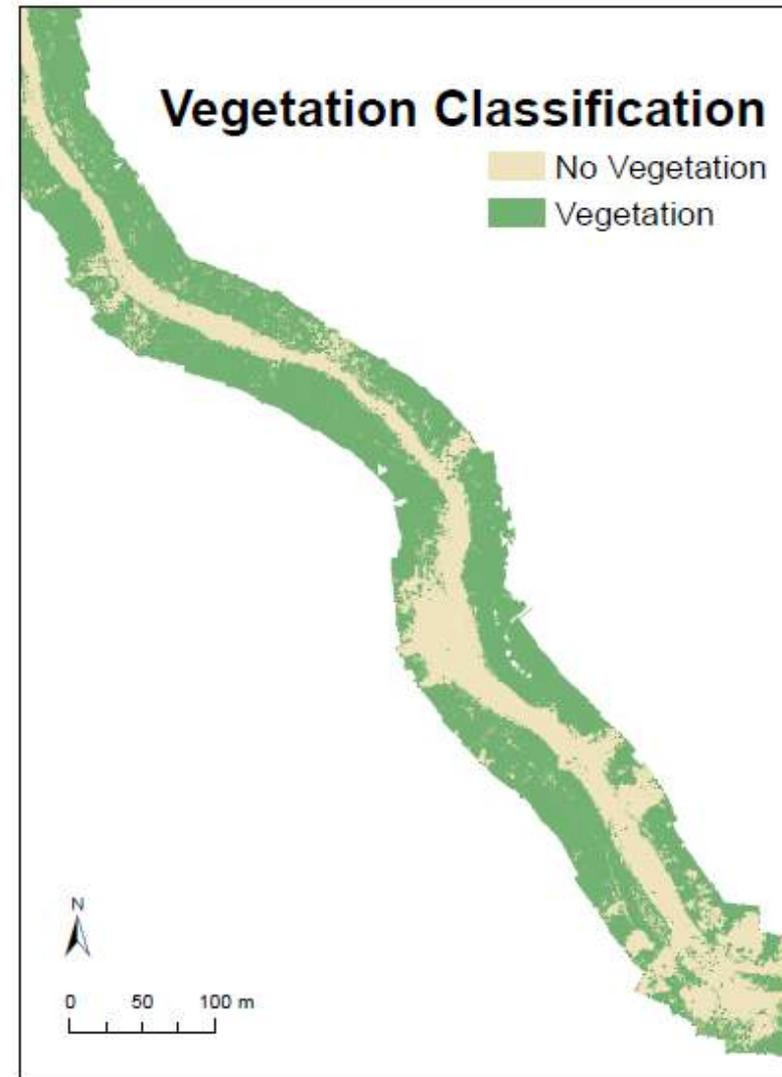
River «Spöl»: Derived products

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

Legend:
- benetzte Fläche 700 l/s
- Überflutungsbereiche 10 m3/s
- Überflutungsbereiche 40 m3/s

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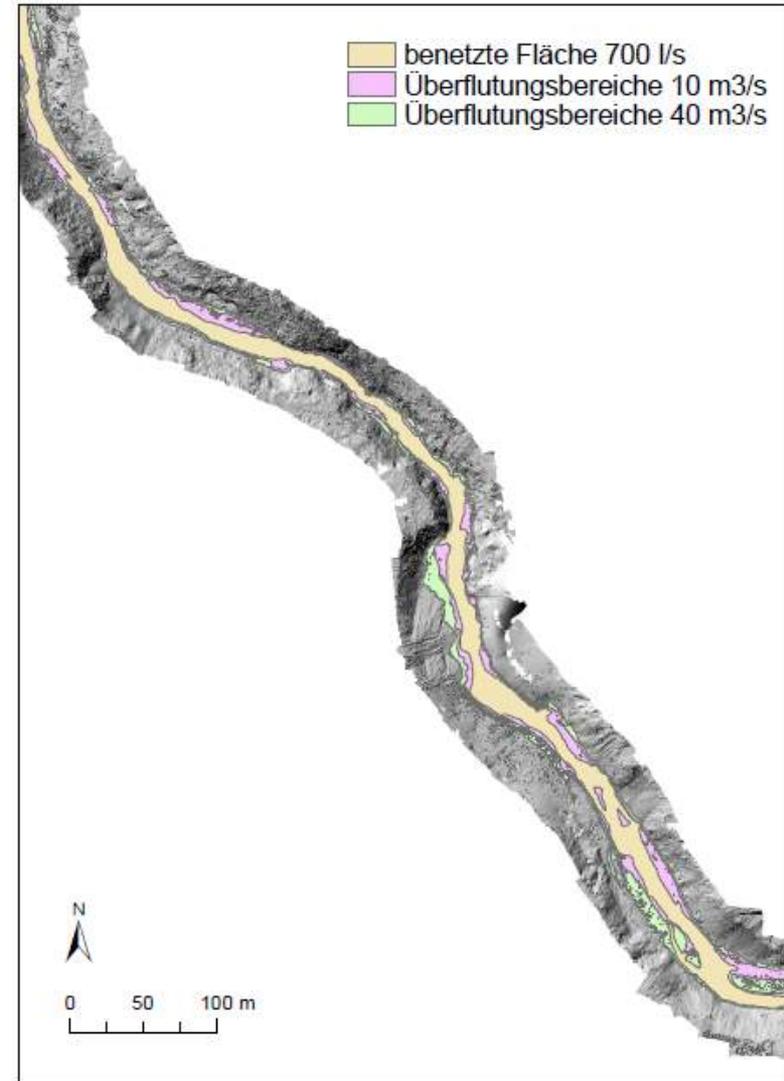
River «Spöl»: Derived products

- Output hydraulic modeling

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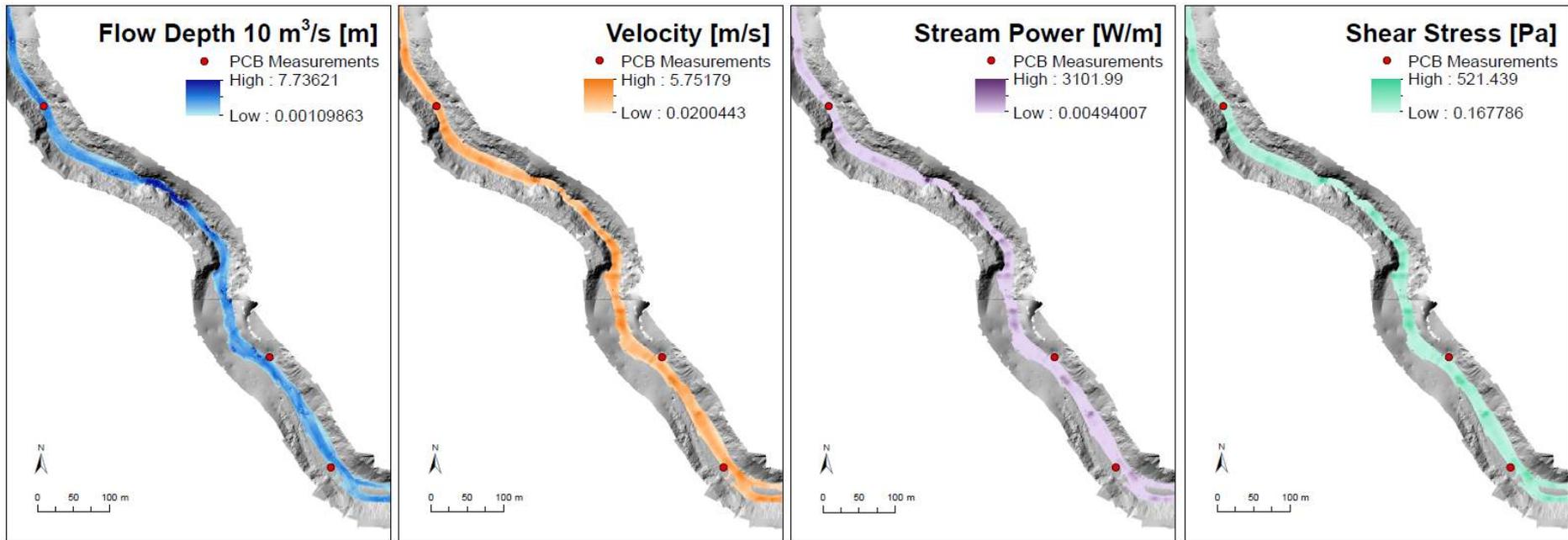
Thermal images

- 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»…
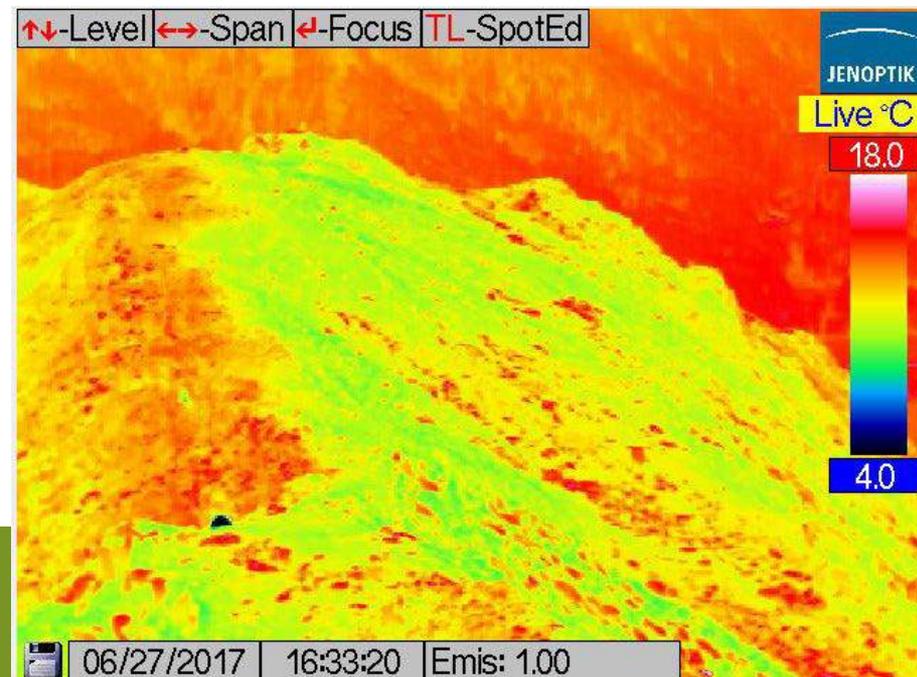
Side product: search flight for fawn of roe deer before mowing

- Requested from gamekeepers
- Early morning
- Media-effective

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