

Long-term monitoring of habitat diversity in the Swiss National Park with imaging spectroscopy

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Project background

- The Swiss National Park (SNP), founded in 1914, is the oldest national park in the Alps and subject to strict process protection (IUCN Cat. Ia)¹
- Last inventory of habitat diversity based on visual interpretation of aerial imagery from 2000²
- Ideal pilot site for establishment of long-term monitoring framework for habitat diversity based on remote sensing data
- Exceptional availability of multi-annual airborne imaging spectroscopy (IS) data acquired with the APEX sensor³ for testing purposes

APEX acquired IS data in 284 bands from 400 to 2,400 nm with a spatial resolution of 2 m.

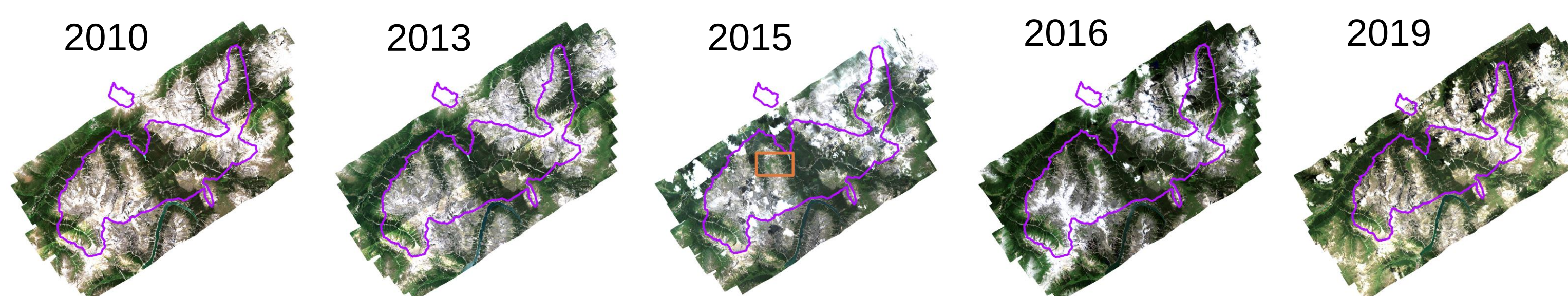


Figure 2: Selected true color composites of APEX flight strips. Swiss National Park boundaries in magenta, zoomed view of Figure 3 (2015) in orange.

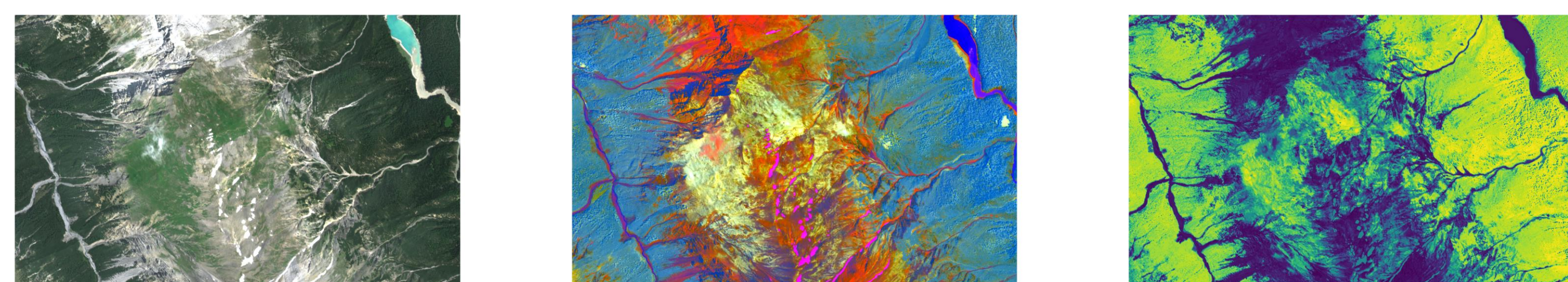


Figure 3: Fuorcla Murter in 2015. Left: True color composite. Middle: First 3 principle components. Right: fractional vegetation cover with yellowish colors indicating higher coverage of forest, shrub-, and grassland.

Work packages

- Further processing of flight strips to create seamless mosaics for ~170 km² of mountainous terrain, including improved spatial co-registration and mitigation of anisotropy effects
- Derivation of time series of spatially continuous products on sub-pixel scale such as fractional land cover, plant trait and species communities estimates
- Using APEX-derived products to assess the potential of spaceborne imaging spectrometers such as PRISMA (ASI), EnMAP (DLR), CHIME (ESA) and SBG (NASA) to ensure data continuity

Spaceborne imaging spectrometers provide data with global coverage, acquiring repeated observations with a spatial resolution of ~30 m!

Acknowledgements

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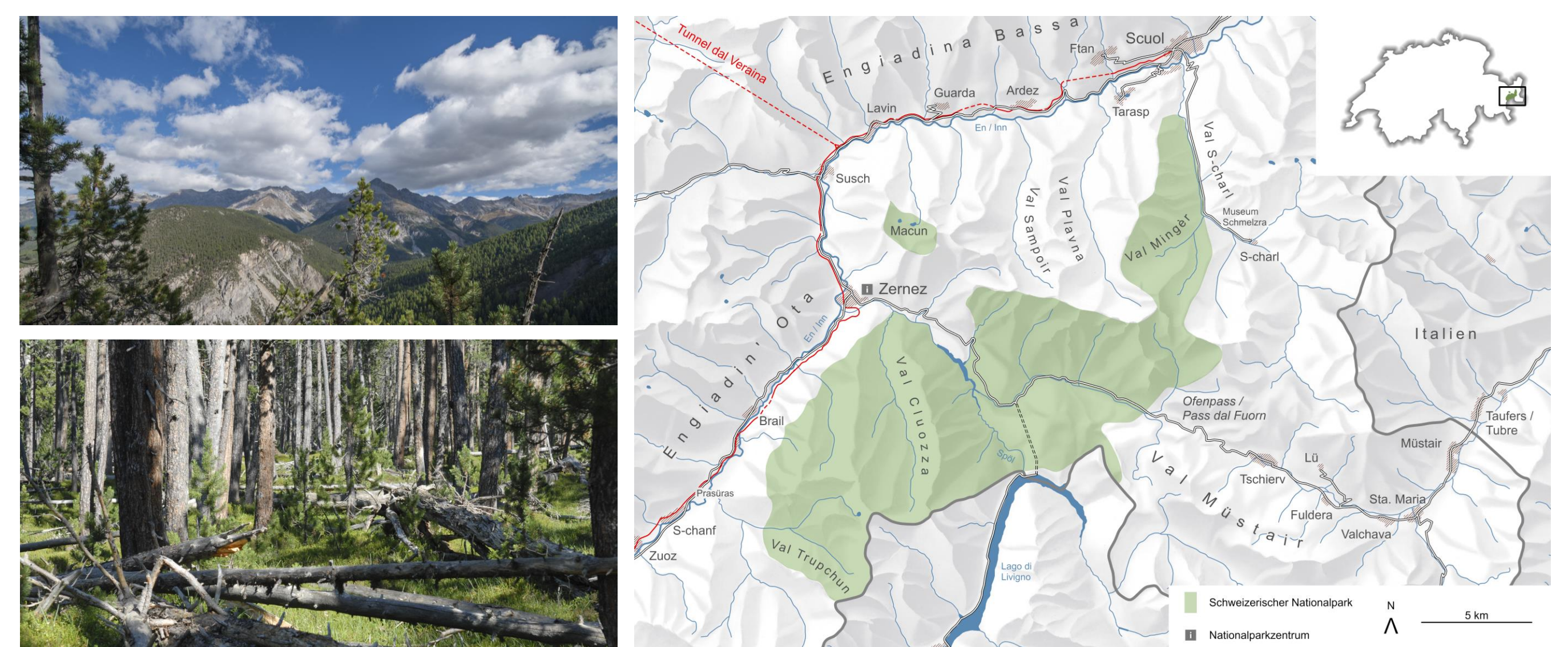


Figure 1: Impressions and location of the Swiss National Park. Image credits: SNP/Hans Lozza. Map Credits: swisstopo (data), SNP/Christine Rösch (visualization).

Core objectives

- Proof of concept for monitoring and quantifying the impact of strict process protection on habitat diversity with remote sensing from 2010 to 2019
- Assessment of the added value of the temporal dimension due to the exceptional availability of multi-annual IS data
- Exploration of the scalability of methods from high resolution airborne to medium resolution spaceborne IS data for long-term continuity
- Implementation and dissemination of replicable open-source methodology to derive information related to habitat diversity

Community benefits

- SNP as pilot site: establishment of exemplary long-term monitoring framework based on remote sensing scalable to other alpine areas
- Provision of improved knowledge about data requirements and methodology for monitoring alpine habitat diversity using airborne and spaceborne IS
- Point of contact for interested stakeholders such as the scientific community and protected area administrations

For more information about the SNP and ongoing research, visit <https://nationalpark.ch> or scan the QR code below!

References

- ¹ Website SNP ² Lotz et al. (2006). Alpine Habitat Diversity Project Report 2002 - 2006
³ Schaepman et al. (2015). <https://doi.org/10.1016/j.rse.2014.11.014>

