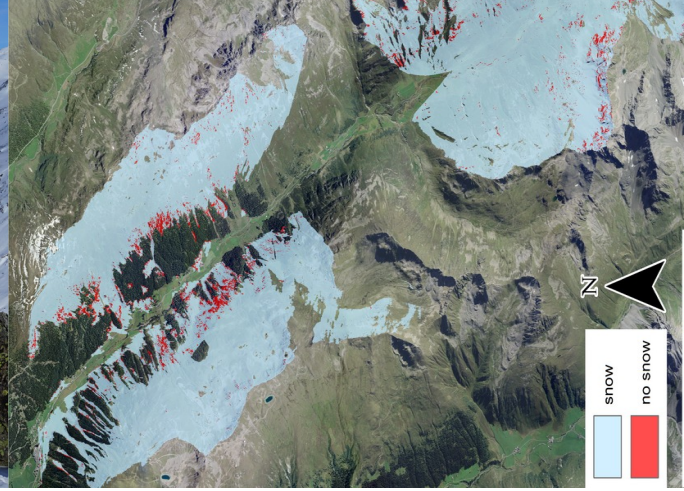


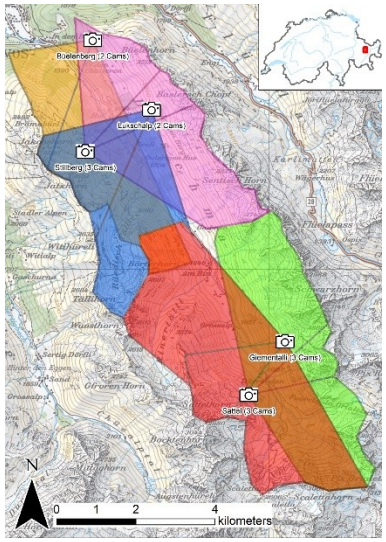


“Master thesis”
Automatically identifying snow and sorting out foggy photographs relying on deep learning

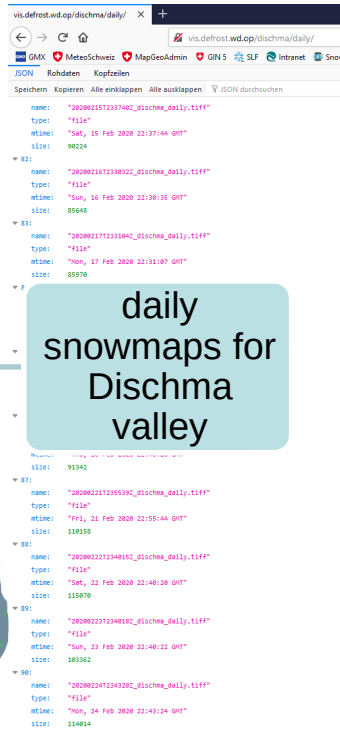
SLF und Ecovision Lab@ETHZ/UZH

Elisabeth Hafner, Yves Bühler
Rodrigo Caye Daudt, Jan Dirk Wegner

Past Project- DeFrost



improve snow classification



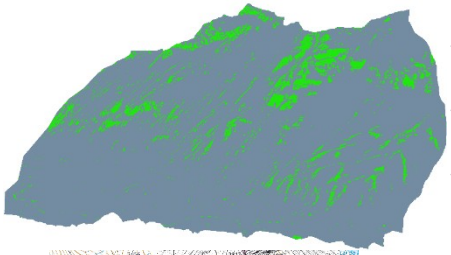
test sites with infrastructure

cameras acquiring images daily

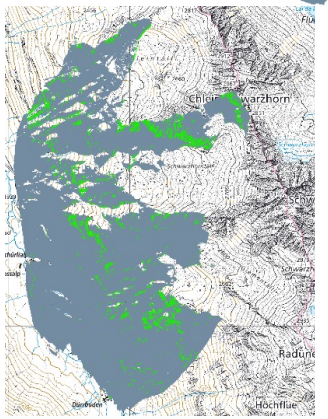
selection of appropriate images

snow classification, snow cover map generation

daily snowmaps for Dischma valley



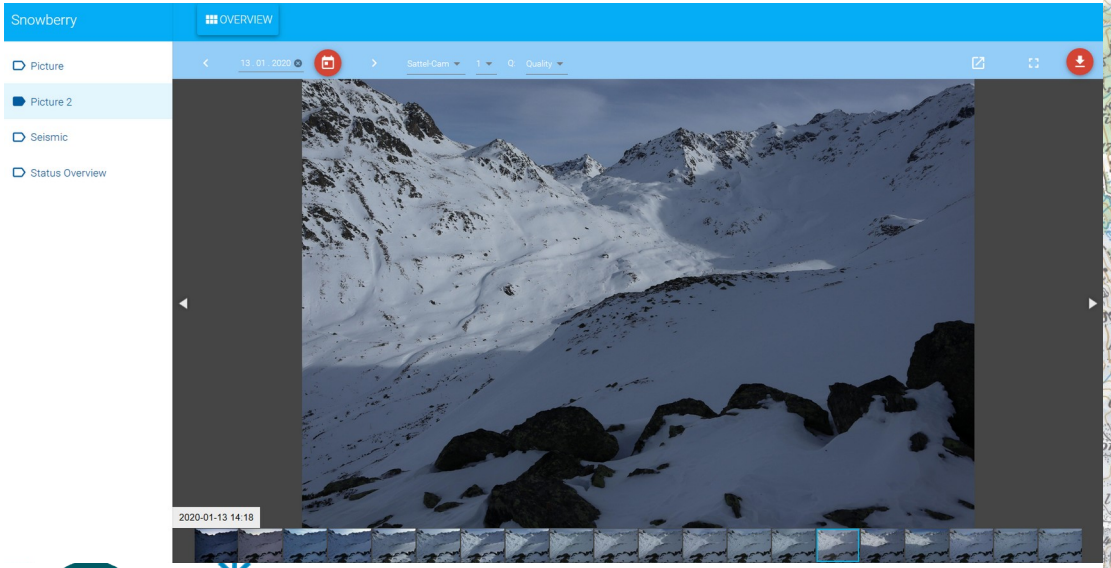
make independent of threshold

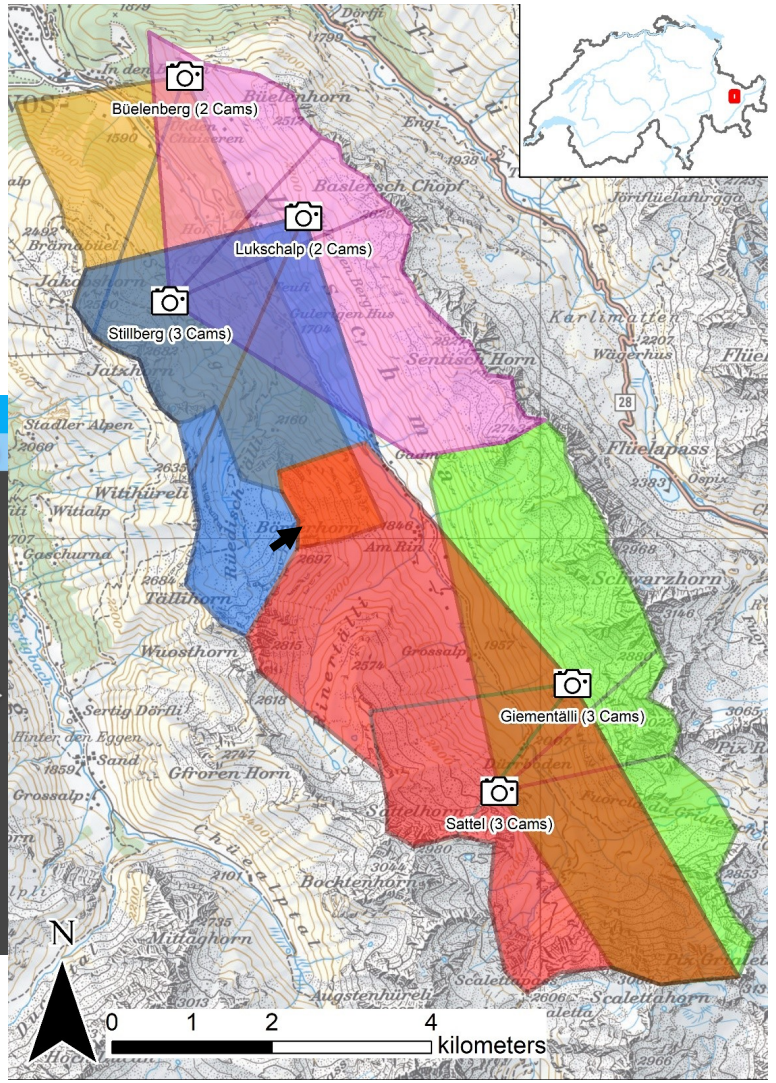


Operational camera system

- Five sites with a total of 13 cameras
  - 6th site to be mounted soon

- Images acquired every 30/60 minutes and available in near real-time

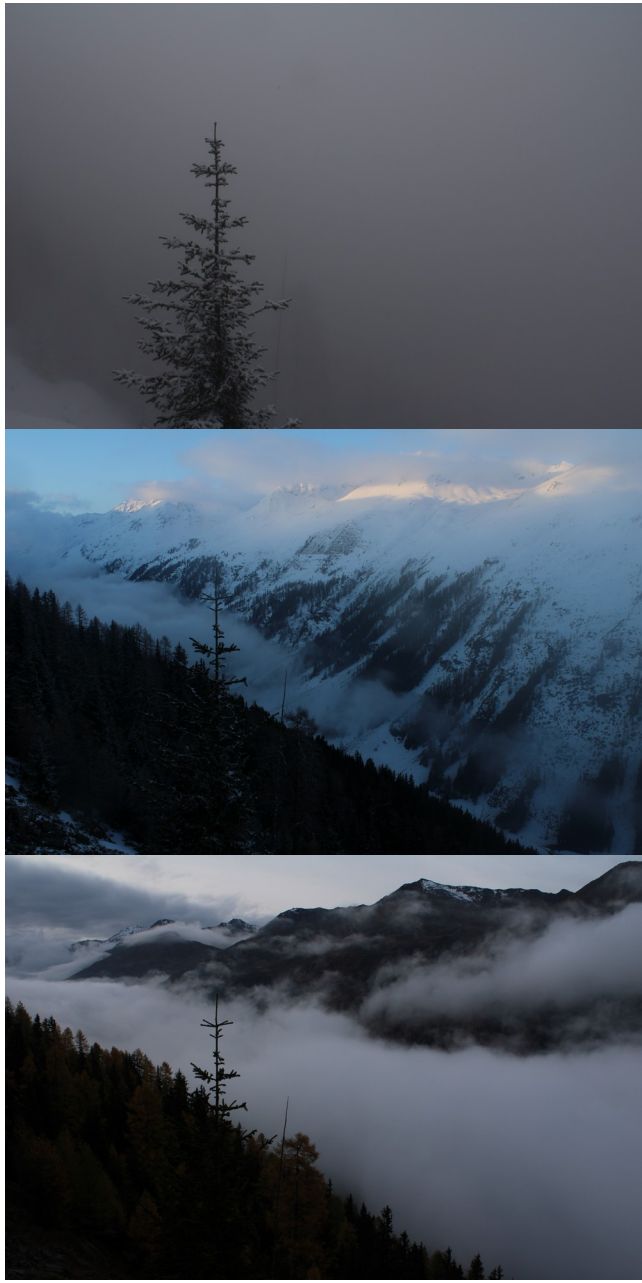




Fog/no Fog classification

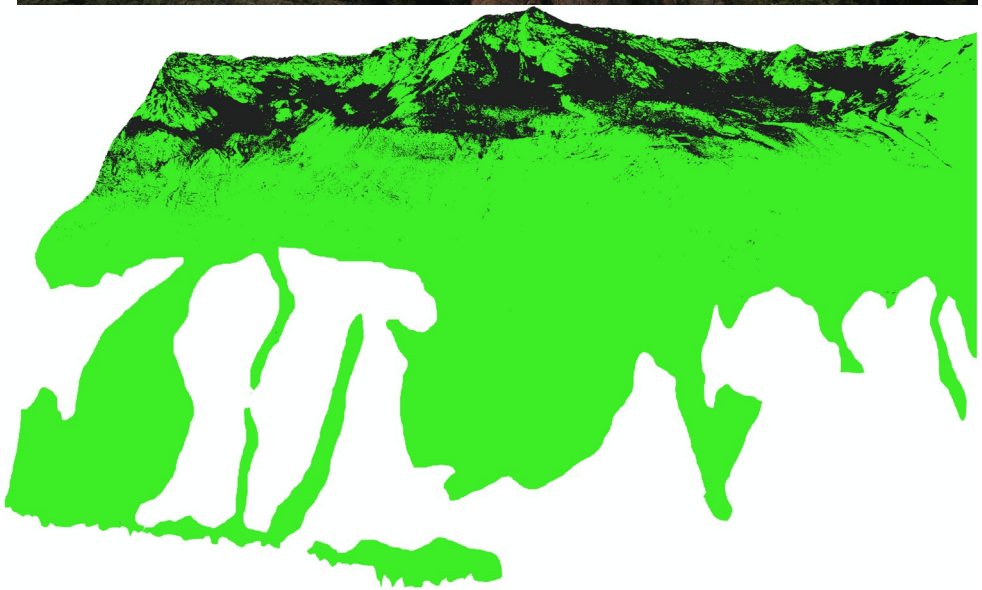
- currently fog index threshold distinct for each camera
  - calculated with manually classified images in Matlab
  - observed pixel intensity is used to estimate atmospheric transmittance

- applied on all images per day and remaining images used for composite generation
    - composites used for snow classification



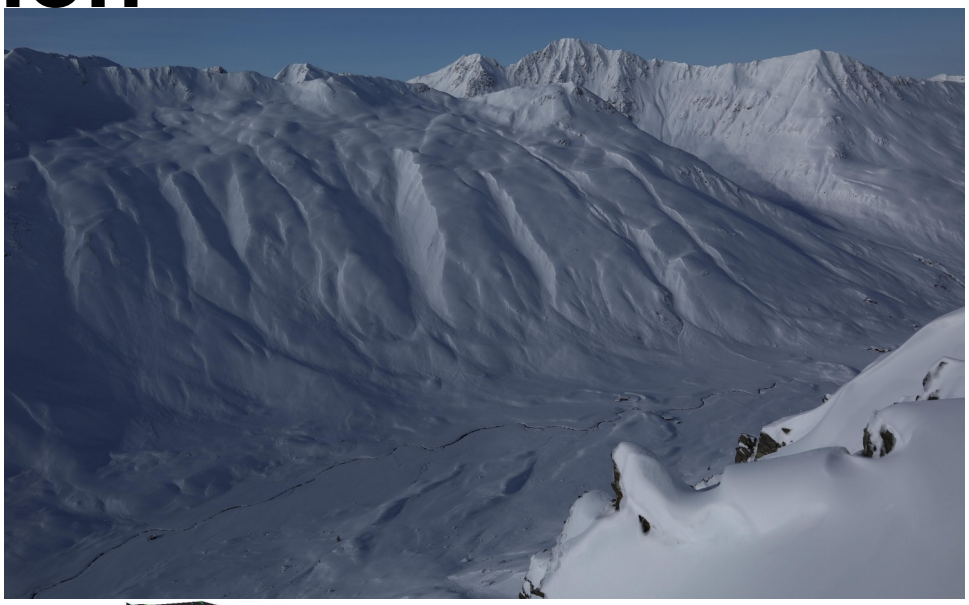
Snow Classification

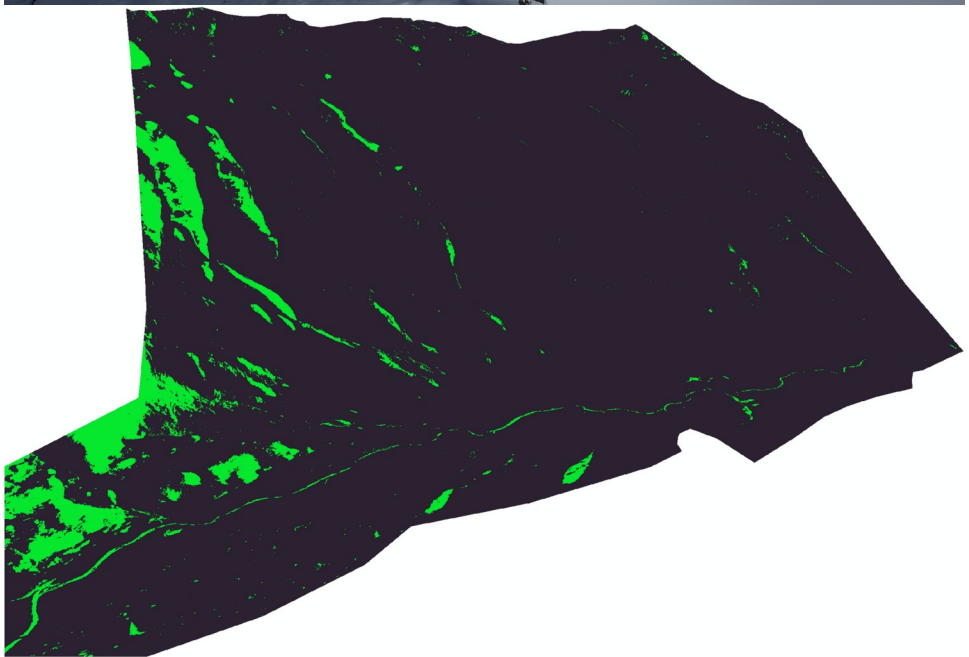
- Principal Component Analysis (PCA) from RGB
- Thresholds: mostly snow, intermediate, sparse snow needs manual adaption
- Results depend heavily on light and snow conditions



Snow Classification

- Misclassification in the shade
- Manual threshold adaption “always behind” and prone to misclassifications in transition from fall to winter (and winter to spring)





Better results through ML?

- Image classification✉ filtering foggy images
- Semantic segmentation✉ snow yes/no per pixel
  - train a network for snow/ no snow
    - different snow/ illumination conditions
    - 1000+ images from all year round and 13 Cams available
  - the existing snow classifications ✉ training
    - manually sort out bad images
    - first stations/data since summer 2019
- needs to be fast✉ snowmaps calculated every evening

Questions?

Next steps

- let me know in until Thursday 9.12.21 if you are still interested and if yes upload your applications via Sirup
- we would then be contacting you for interviews with all people supervising involved