MSc Topic – Performance of satellite-, drone-based and terrestrial estimation for vegetation season on-set in the Swiss Alps

Introduction
Health and growth of vegetation in alpine regions are closely connected to the end of winter dormancy and snow cover. In order to monitor the suitability of vegetation species, the correlation between vegetation season start and length is monitored. The on-set of the snow-free time, detected with remote sensing techniques, is used as proxy to evaluate the evolution of the vegetation. This thesis shall investigate an alpine region with a variety of optical remote sensing data available to assess advantages, accuracy and reliability of each individual technique. Assessing the vegetation health based on the start of season and growing season length also requires a measure for the vegetation activity. In particular, with satellite data vegetation activity as well as snow cover can be measured via different optical bands (e.g., NIR or SWIR) while drone images or terrestrial images (i.e., webcam) are often limited to RGB bands and visual interpretation.
Key words for processing are satellite time series (e.g., Sentinel-2 time series), drone images, webcam and high-resolution satellite data. This thesis is a collaboration with an engineering bureau of Canton Wallis.

Keywords
Vegetation season, snow cover, optical remote sensing, satellite, drones, image interpretation, accuracy budget, validation, multi-year time-series

Work Packages
- Get familiar with techniques for detection of snow cover and start of vegetation season
- Implement the analysis of Sentinel-2 time-series for detection of start of season and snow cover
- Get familiar with the available validation data set
- Compare results and cross-validate all used technologies and results
- Critical assessment of each of the outcomes and technologies including the accuracy budget

Requirements:
- Basic knowledge of different remote sensing techniques in the optical domain
- Basic skills in R, Python and/or Google Earth Engine
- Interest of exchange with a non-academic partner
- Critical thinking

Opportunities offered by this MSc
- Working on big data and time-series analysis of satellite data
- Applied research with a non-academic partner
- Insights into strengths and weaknesses of different technologies
- Develop a critical thinking and interpretation of results

Supervision:
If you are interested and for more information, please contact Claudia.roeoesli@geo.uzh.ch
Completed with the team members of the NPOC