

PhD in *Boundary ecotone vegetation mapping using satellite and airborne platforms*

Background

Boundary ecotones in cold and dry regions are subject to rapid change in vegetation cover due to natural and anthropogenic environmental change. The accurate mapping of such cover change is highly relevant for the appropriate assessment of the impacts on land use and biogeochemistry on local, regional and global scales. Satellite remote sensing is an essential tool to monitor land cover change, but faces several challenges in borderline ecotones, in particular in drylands. First, the often sparse vegetation causes a mixed spectral signal received by sensors operating at great altitude, such as satellites. In addition, the pulsed reaction of vegetation, in particular annuals, to the rainfall events is often missed by satellites passing over the land in regular, but comparatively long intervals. Airborne platforms offer the possibility to overcome these two shortcomings, but cover only small areas at a time. Combining the information gathered by satellite and airborne systems could provide a solution to these problems, i.e. through calibrating satellite data using airborne and UAV imagery.

Aim and scope of the PhD project

A good balance between resolution and the size of the area captured by airborne sensors is critical for an effective combination of information with satellite. The aim of this PhD project is therefore the identification of the suitable combinations of different airborne sensors platforms with common satellite data for mapping land cover change in borderline ecotones in alpine and dryland environments.

The PhD in *Boundary ecotone vegetation mapping using satellite and airborne platforms* will involve the acquisition of imagery using airborne sensors, including Unmanned Aerial Vehicles and piloted aircraft. The representation of vegetation cover in all imagery will be compared and tools for a combination that enables the best assessment of land cover change will be developed. The acquisition of airborne imagery also contains the generation of data of a quality to be expected from aircraft operating in the stratosphere. Such simulation aims at assessing and developing tools flown onboard a new generation of piloted aircraft and automated systems operating at low cost, but long duration at high altitudes. The image acquisition and product development for the airborne sensors will be carried out in close collaboration with *Solar Stratos* (www.solarstratos.com). A key aim of the collaboration is the support of the development of sensors that can be carried by the solar-powered aircraft developed by *Solar Stratos* to the stratosphere. Study areas of the PhD project are situated in alpine boundary ecotones in the Swiss Alps and rangelands in South Africa.

Profile of candidates

Applicants should have a strong interest in remote sensing and environmental change, hold a master's degree in geo- or environmental sciences, ideally with a thesis in image analysis. Applicants must have a very good command of English.

The PhD programme at the University of Basel is a four-year program. PhD-students are expected to support teaching and research activities of the Physical Geography and Environmental Change Research Group.

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