Master thesis project in Remote Sensing and Forest Pathology

Reconstructing spatial and temporal spread of invasive forest pathogens using satellite images and machine learning
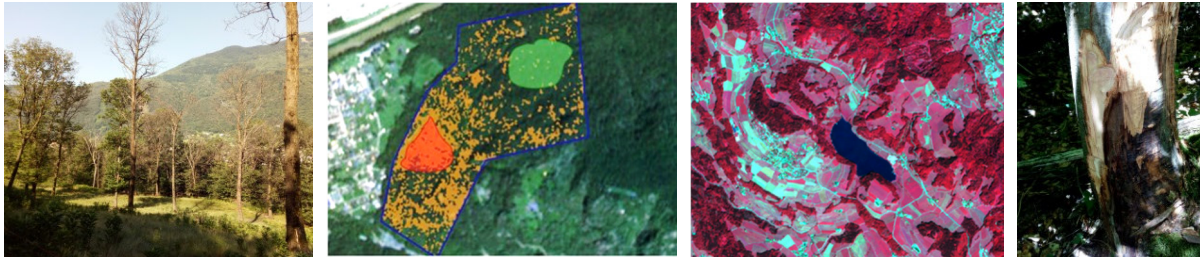
Background: Ink disease caused by the two invasive oomycete species *Phytophthora cinnamomi* and *P. x cambivora* is a serious threat for sweet chestnut (*Castanea sativa*) stands in Southern Switzerland. These soilborne pathogens infect the roots and can rapidly kill a tree. According to the local forest service, the disease has emerged in the last three decades and it is still spreading.

In this master thesis, the potential of using Sentinel-2 time series to reconstruct temporal and spatial spread of ink disease in Southern Switzerland is explored. Based on reference data from field surveys, freely available Sentinel-2 images, LiDAR data and aerial images a machine learning approach, e.g. Random Forest, will be set up to predict potentially affected areas. Knowledge on these areas is highly relevant for foresters and beyond.

Link: The thesis is part of the project "Ink disease of chestnut: is climate change responsible for its emergence?" in the frame of the Pilot program "Adaptation to climate change" from the Federal Office of Environment (https://www.nccs.admin.ch/nccs/en/home/measures/pak.html).

Requirements: Student in geography, forest ecology or related fields, highly motivated, willing to learn scientific work. Good English skills. Experience in R programming, basic knowledge in remote sensing and modeling are advantageous.

Offers: Possibility to publish the results of the study in a peer-reviewed scientific journal. A shared office space and good inhouse expert knowledge on the topic (Remote Sensing group) at WSL in Birmensdorf is guaranteed. Interaction with the international scientific community is encouraged. If desired, a full immersion in the fascinating world of forest pathology, including some field and laboratory work (Phytopathology group).

Support: Simone Prospero (phytopathology, project leader), Lars Waser (remote sensing).

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