

Laboratory of Ecological Systems

Prof. Alexandre Buttler



WSL Group

Pasture Woodlands
and Wetlands

WSL in the
Romandie

A Joint-venture
WSL-EPFL

Agreement
ENAC-WSL

The scientific focus of the ECOS lab is on the organization, functioning and dynamics of terrestrial plant, animal and microbial communities, in relation to ecological processes.

A strong focus is the functional links between above-(vegetation) and belowground (soil) biological communities in the delivery of critical ecosystem services and as indicators of a changing environment (land-use and climate change).

To study these complex interactions, we propose an integrative approach using methods in community ecology and soil biogeochemistry, with both experimental and modeling methods.

The model ecosystems we study are mountain pastures, wooded pastures and wetlands (bogs, fens and floodplains).

**Agroscope
Cadenazzo**

Strengths in
applied science
in agriculture

**Agroscope
Changins**

Strengths in
environmental
engineering and
modelling of
abiotics: air, water,
soil

**EPFL-ENAC
Environmental
Engineering
(IIE)**

ETHZ

Site Belinzona

Site Davos

**Research Unit
Community Ecology**

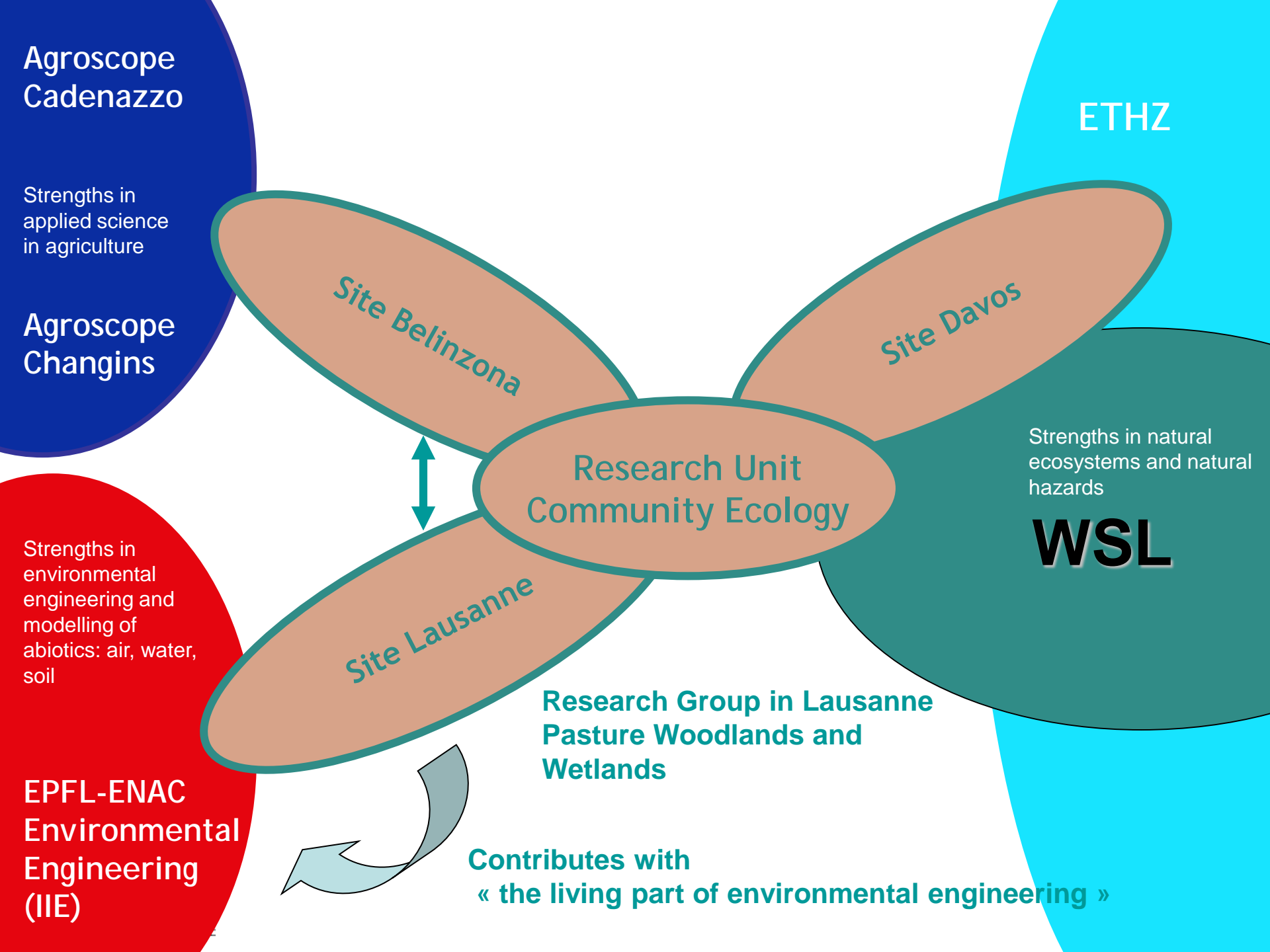
Strengths in natural
ecosystems and natural
hazards

WSL

Site Lausanne

**Research Group in Lausanne
Pasture Woodlands and
Wetlands**

**Contributes with
« the living part of environmental engineering »**



Scientific orientation

Aim: Interaction between vegetation and soil, and impact of global (land-use) and climate change

Focus: Impact on natural and semi-natural sensitive ecosystems such as mountain grasslands, pasture woodlands, wetlands and river margins

Specificity: Ecological studies at the interface between forest/trees and grasslands/agriculture land, and at the interface between aquatic and terrestrial ecosystems

Application: Ecosystem management and restoration, ecological engineering

A functional approach of ecological boundaries

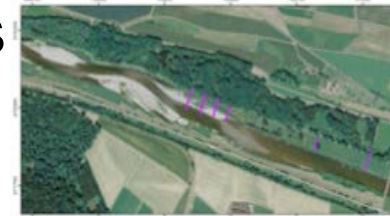
Between forest/trees and grasslands/agriculture



Between water bodies and terrestrial soil



Between aboveground (vegetation) and belowground (soil, microorganisms) compartments

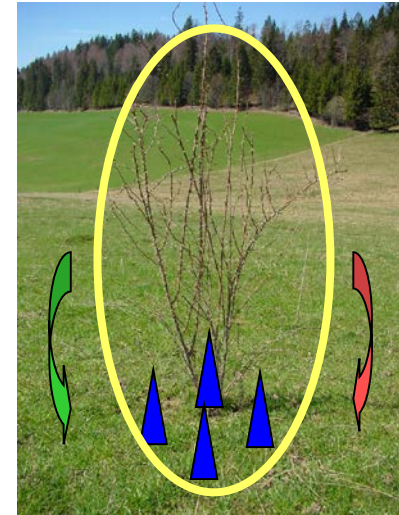


Laboratory of Ecological Systems - ECOS

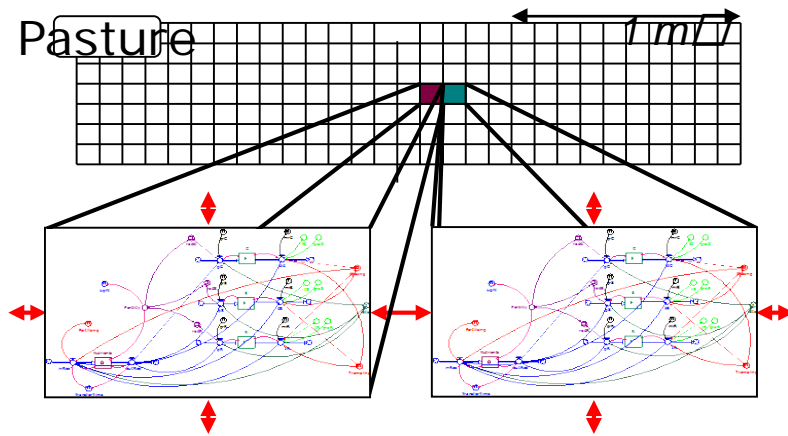
Prof. Alexandre BUTTLER



*Landscape patterning
and biodiversity*



Landscape modeling

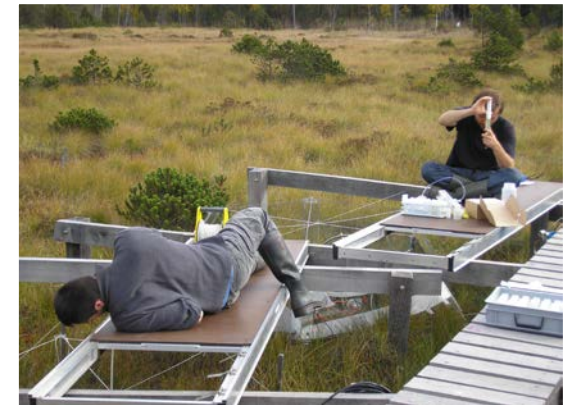
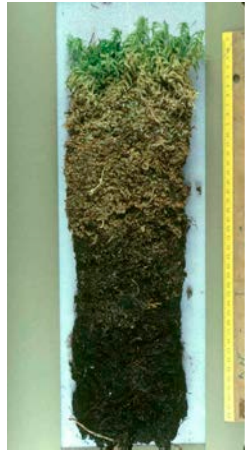


*Field measures
and experiments*



Effect of climate warming on biotic communities and carbon balance in *Sphagnum* peatlands

Projects: Peatwarm, ClimPeat, VeganPeat, Sphagnol



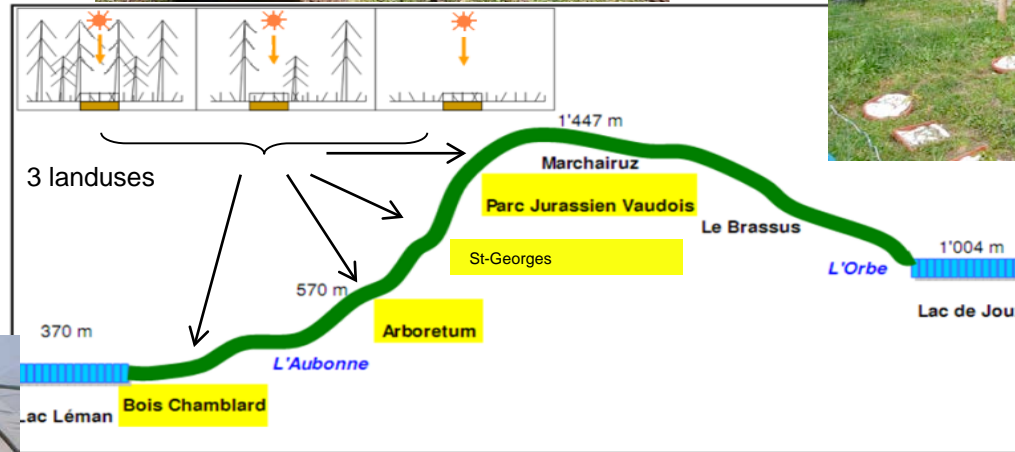
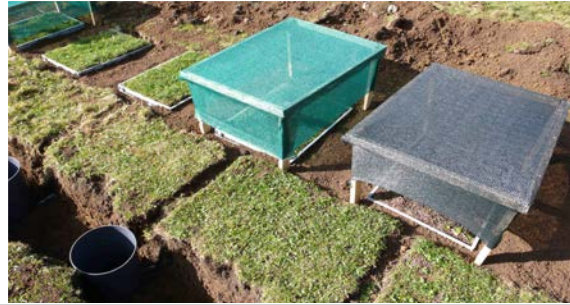
Research question:

1. Carbon (C) sequestration by increased vegetation production vs C losses by increased soil respiration.
2. Competition between plants and microorganisms for resource acquisition.



Integrative analysis of ecosystem dynamics under global change in sylvopastoral ecosystems and grasslands

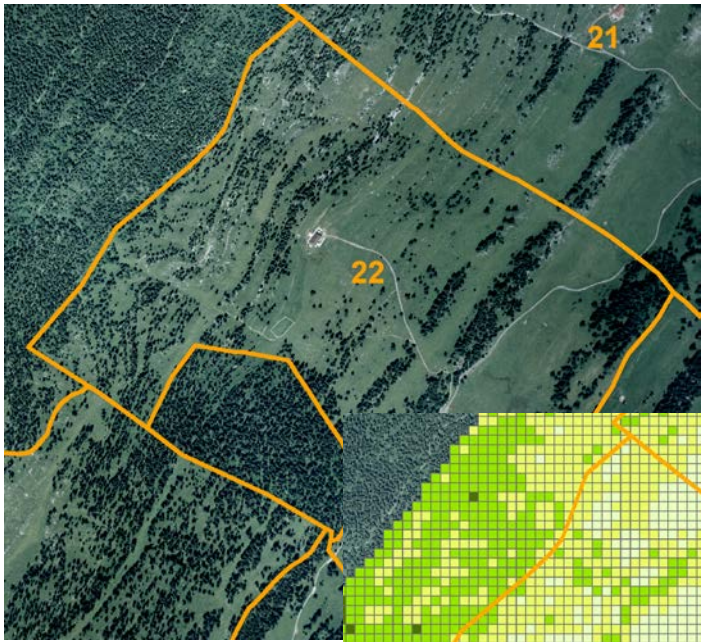
Projects: Mountland, GrassAlt, Présecs, Subfunc, Climarbre



Research question:

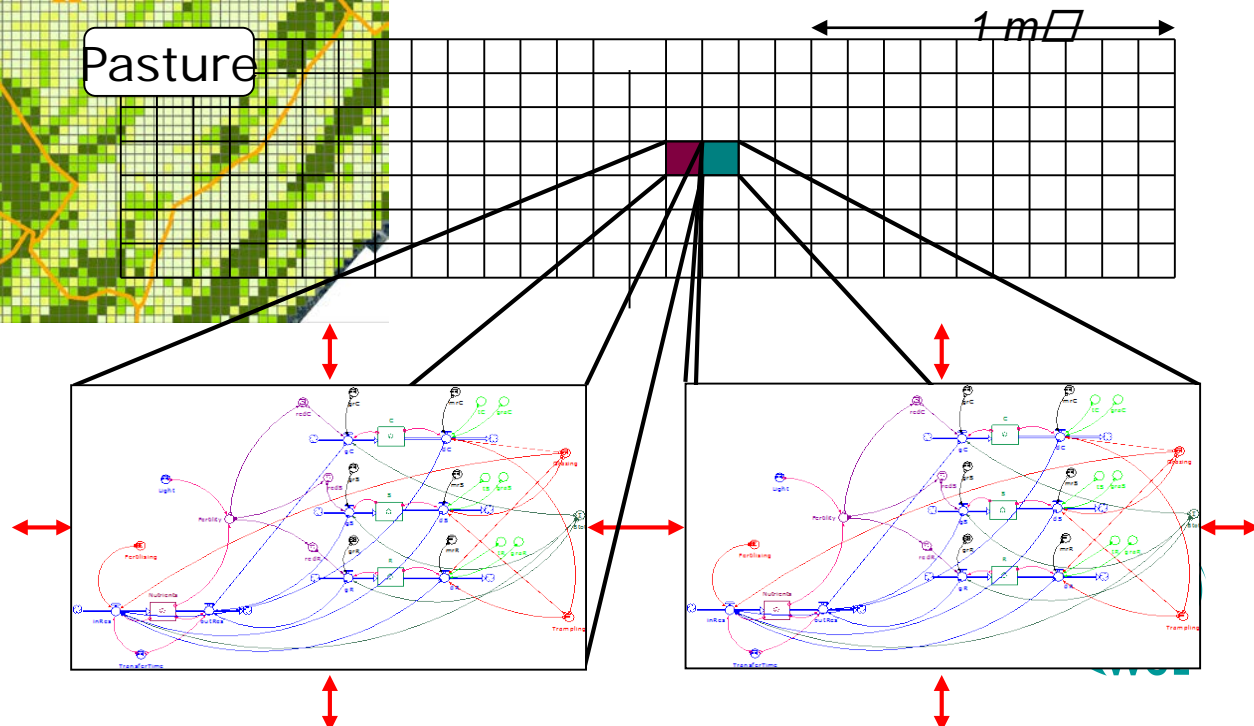
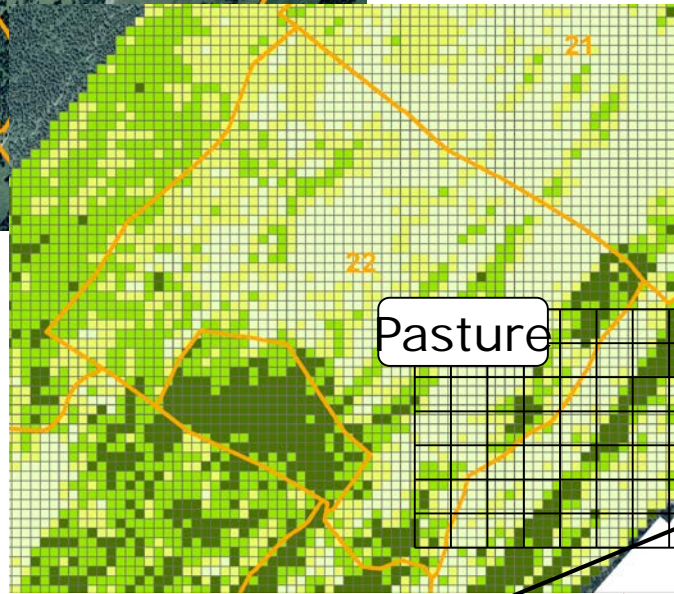
What is the vegetation and soil resilience under warmer conditions (e.g. species and carbon turnover, species adaptation)?





Research question:

Will climate warming accelerate landscape change within historically sustainable systems?



Land-uses:

Open pasture

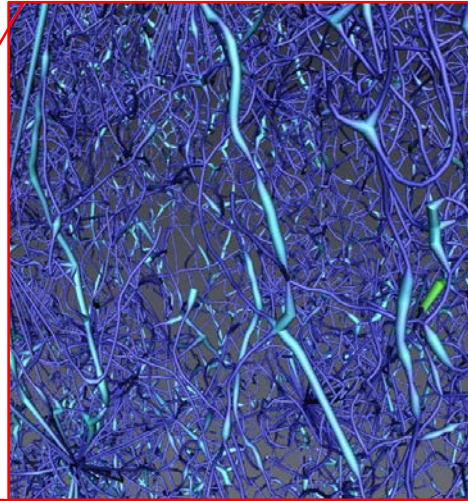
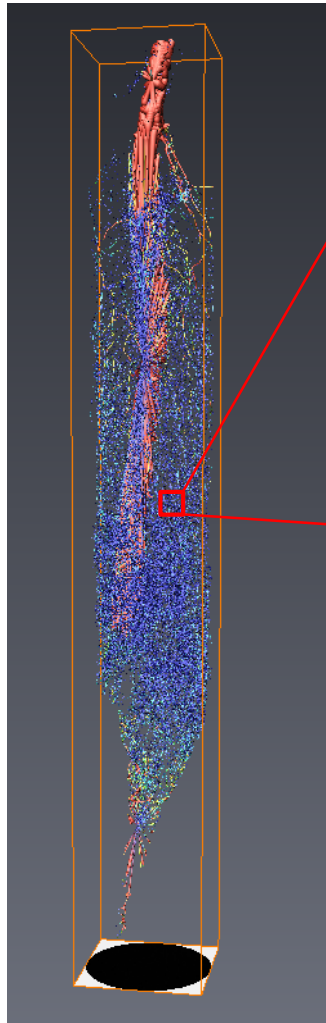
Pasture with few trees

Pasture with dense trees

Pastured forest

River restoration *versus* soil formation and ecological functions

Project: Record



5 mm



Quantitative analysis of soil components and structure by X-ray computed tomography

Research question:

- 1 How does environmental heterogeneity along river margins reflect belowground patterns and processes?
- 2 How can soil organic matter be used as an indicator of successful restoration?

Soil recovery and land-use optimization in slash and burn cultivation in Madagascar

Project: AgriFeu



Community resistance to invading plants

