

ECOTUMN 2026

Autumn school

12 – 16 october • Grenoble



FROM LOCAL TO GLOBAL : ECOLOGICAL SHIFTS AND ADAPTIVE RESPONSES

From urbanized seashores to Alpine summits, from butterfly gene to ibex population, from plant traits to landscape communities, embark on a scientific journey through the various facets of ecology with ECOTUMN, a self-organized research school for PhD students. This autumn school will explore the broad panel of scales studied in ecology, and how species adapt and/or shift along these scales.



CONFERENCES

12/10 - 13/10 - 14/10

Free meals and registration

3 days | Grenoble - IMAG

- Conferences of experts in Ecology and Evolution
- Poster session
- Screening of a scientific documentary and discussion



FIELD TRIP

15/10 - 16/10

Free meals, registration and accomodation

2 days | Jardin Alpin du Lautaret

- Field trip at the Col du Lautaret
- Talks on alpine ecology research projects



JOIN THE LECA 6TH AUTUMN SCHOOL ! CONTACT : ECOTUMN@GMAIL.COM
OPEN TO ALL PHD STUDENTS AND POST-DOCS - LIMITED TO 24 PARTICIPANTS

MONDAY
12/10

9h00 - 9h30 : COFFEE

Fabrice Roux - LIPME, Toulouse

Adaptive genetics in *Arabidopsis thaliana*

10h30 - 10h50 : BREAK

Mathieu Joron - CEF, Montpellier

From supergenes to species: how recombination suppression shapes adaptation and speciation

TUESDAY
13/10

9h00 - 9h30 : COFFEE

Nicolas Bierne - ISEM, Montpellier

Urban rendezvous in the docks : genetic remix of marine life in the Anthropocene

10h30 - 10h50 : BREAK

Cécilia Claeys - UPVD, Perpignan

Human Societies' Adaptation to Climate Change: Contradictory Injunctions and Unequal Environmental Efforts

WEDNESDAY
14/10

9h00 - 9h30 : COFFEE

Elena Hamann - HHU, Düsseldorf

From mountains to mustard : How plants adapt to a changing world

10h30 - 10h50 : BREAK

Katharina Ramskogler - IGF, Innsbruck

Proglacial areas in transition: Linking vegetation succession, geomorphic processes, and long-term land-cover change

11h50 - 13h30 : LUNCH BREAK

13h30 - 14h30 : POSTER SESSION

Christian Rixen - SLF, Davos

Cool plants in a hot world

15h30 - 15h50 : BREAK

Mathilde Defourneaux-LECA, Chambéry

Title to come

13h30 - 14h30 : POSTER SESSION

Caterina Penone - LECA, Grenoble

Effects of land-use intensification on biodiversity and ecosystem functioning at local and landscape scales

15h30 - 15h50 : BREAK

Pascal Lacroix - IGE, Grenoble

Recent large landslides in high mountains: characteristics, causes, and lessons for the future

Scientific documentary
"The abominable mystery of flowers"

Co-written by Clément Champiat and François Tribolet, scientific advisor François Parcy, produced by Magnéto - CNRS Images.

with participation of :
Sebastien Lavergne - LECA, Grenoble
Darwin, plants, and the great mystery of evolution

THURSDAY 15/10

**8h : departure from IMAG,
Grenoble**

**9h30 - 10h : arrival and
installation at the Jardin du
Lautaret**

**Philippe Choler (LECA,
Grenoble)**
**Jérôme Poulenard (EDYTEM,
Chambéry)**
Landscape interpretation

HIKE AND PICNIC

15h30 - 15h50 : BREAK

**Felix De Tombeur - CEFE,
Montpellier**
Silicon dynamics in the Earth's Critical
Zone: an eco-geo-chemical journey

16h50 : FREE TIME AND DINNER

FRIDAY 16/10

9h00 - 9h30 : COFFEE

**Presentation of researches taking
place at the Jardin du Lautaret**

10h50 - 11h10 : BREAK

Simon Gascoin - CESBIO, Toulouse
Snow: A Key Driver of Alpine
Ecosystems

12h10 - 13h30 : LUNCH BREAK

**14h : DEPARTURE
for Grenoble**

Field trip informations :

- Accommodation at the Jardin du Lautaret will be in shared dormitories of 4, 6 or 8 people.
- The Jardin du Lautaret is situated at 2100m, dress accordingly : hiking shoes, warm and rainproof clothing, solar protection.

Nicolas Bierne - Montpellier Institute of Evolutionary Sciences, Montpellier
Urban rendezvous in the docks : genetic remix of marine life in the Anthropocene

Human transport across the Anthropocene ocean increasingly brings together lineages that have evolved in isolation, particularly in ports and other heavily modified coastal habitats. Beyond their role as hubs for biological invasions, ports can be seen as Darwinian field laboratories where divergent genomes meet and recombine under novel environmental conditions. I will illustrate this process with two marine systems. In Ciona sea squirts, hybridization between an introduced and a native species has resulted in a single hotspot of adaptive introgression concentrated on one chromosome, involving a tandem repeat of a cytochrome P450 gene. In Mytilus mussels, hybridization between invasive Mediterranean M. galloprovincialis and native M. edulis has given rise to the emergence of the "dock mussel", a new port-dwelling ecotype with a surprisingly thoroughly admixed genome. These examples suggest that novel environments may profoundly alter the outcome of hybridization, not necessarily by favouring adaptation from admixture, but by relaxing selection against hybrids when parental populations are themselves maladapted. Adaptive introgression can nevertheless provide specific beneficial variants, while much adaptation to human-altered environments may still draw on genetic variation within species.

Cécilia Claeys - University Perpignan Via Domitia, Perpignan
Human Societies' Adaptation to Climate Change: Contradictory Injunctions and Unequal Environmental Efforts

Despite scientific assessments and whistleblowers documenting the socio-environmental impacts of climate change, human societies struggle to implement coherent, structured adaptation strategies. Drawing on French case studies, this communication analyses two factors explaining these challenging socio-political adaptations: contradictory public policy injunctions and the unequal distribution of environmental efforts they lead to.

Katharina Ramskogler - Institute for Interdisciplinary Mountain Research, Innsbruck
Proglacial areas in transition: linking vegetation succession, geomorphic processes, and long-term land-cover change

Climate change is rapidly transforming high alpine environments, where glacier retreat releases new terrain and reshapes proglacial landscapes. These newly ice-free areas provide key opportunities to investigate primary succession, land-cover development, and the interactions between ecological and geomorphic processes. Nevertheless, vegetation dynamics in proglacial areas are not only controlled by terrain age, but also by various environmental and topographical conditions.

Within this talk, I present results from high alpine study sites in the Central European Alps, focusing on proglacial areas and long-term lateral moraine development since the late nineteenth century in Austria and Italy. Vegetation surveys, environmental measurements, historical terrestrial images, orthophotos, digital monoplottting, and statistical modelling were combined to analyse plant cover, species richness, species composition, land-cover change, and surface dynamics across different spatial and temporal scales.

The results show that vegetation development is influenced by elevation and years ice-free, solar radiation, soil properties, landforms, climate, distance to glacier, permafrost, and grazing, which interact through direct and indirect effects on vegetation cover and species richness, while geomorphic disturbances can interrupt or reverse vegetation expansion. Overall, the findings highlight the value of interdisciplinary approaches for understanding ecosystem trajectories in rapidly changing proglacial landscapes.

Mathieu Joron - Centre for Functional and Evolutionary Ecology, Montpellier
From supergenes to species: how recombination suppression shapes adaptation and speciation

Adaptive traits are shaped by selection and play a central role in local adaptation. Because populations experience multiple sources of selection simultaneously, adaptive evolution can lead to trade-offs, maladaptation, or the emergence of coadapted gene complexes maintained by reduced recombination. Here, I present two case studies illustrating how selection on multiple traits shapes the evolution of recombination suppression.

First, in a tropical butterfly, wing-patterns evolve under selection for Müllerian mimicry. This involves the coadaptation of distinct genetic elements forming near-perfect mimics and maintained together by chromosomal inversions suppressing recombination. However, genetic and ecological dissection reveals that the trajectory of these inversions is also influenced by introgression and the accumulation of deleterious mutations, processes not directly related to mimicry.

Second, a complex of closely related alpine butterfly species illustrates how adaptive and non-adaptive processes contribute to speciation. Here, genome-wide recombination suppression is associated with selection and introgression involving genes affecting mating, altitudinal adaptation, but also genetic incompatibilities, acting as barriers to gene flow.

Elena Hamann - Institute of Plant Ecology & Evolution, Düsseldorf
From mountains to mustard : How plants adapt to a changing world

How do plants respond and adapt when their environments change? Answering this question requires linking ecological responses observed today with evolutionary changes unfolding across generations. My research has explored this question across different plant systems, environments and timescales: from alpine plants responding to climate change, to resurrection experiments revealing rapid contemporary evolution in *Brassica rapa*, and to experimental and genomic approaches investigating the mechanisms and genetic basis of evolutionary change.

In this talk, I will trace this research journey and explore how approaches such as reciprocal transplants and resurrection experiments allow us to disentangle plastic responses from evolutionary change. I will discuss how populations can evolve in response to environmental change, how genomic approaches can help reveal the genetic basis of these changes, and how adaptation is shaped by trade-offs and interactions with other organisms. In particular, my recent work examines how responses to drought can interact with plant-herbivore interactions, highlighting the importance of considering environmental change in an ecological context rather than in isolation.

Together, these studies illustrate how combining perspectives across space, time and levels of biological organization can help us understand when and how plants adapt to a changing world.

Fabrice Roux - Plant-Microbe-Environment Interactions Laboratory, Toulouse
Adaptive genetics in *Arabidopsis thaliana*

One of the main goals in ecological genomics is uncovering the genetic basis of adaptation in ecologically realistic environments. Integrating ecological perspectives into adaptive genetics allows us to understand better how species evolve in response to natural selection and anthropogenic environmental changes. In my talk, I will first present a genomic map of adaptation in the annual plant *Arabidopsis thaliana*, focusing on its interactions with complex communities (microbiota and plant communities). Next, I will share findings from a resurrection study that demonstrate how intermediate levels of synergistic pleiotropy in *A. thaliana* facilitated adaptive evolution in response to climate warming in ecological time. Finally, I will discuss preliminary results on the phenotypic, demographic, and genomic evolution of 168 natural populations of *A. thaliana* in the south-west of France over 10 generations.

Caterina Penone - Laboratoire d'Ecologie Alpine, Grenoble

Effects of land-use intensification on biodiversity and ecosystem functioning at local and landscape scales

Land-use intensification is considered a major driver of biodiversity loss. However, quantifying it at large spatial scales has proven challenging. The Biodiversity Exploratories, a large coordinated program with plots on both grasslands and forests, allowed us to study the effects of land-use intensification on biodiversity and ecosystem functioning across these ecosystems. I will present the main findings from the last 20 years of research in the Exploratories spanning multiple trophic groups both above- and belowground, as well as ecosystem functions at local and landscape scales.

Christian Rixen - Institute for Snow and Avalanche Research, Davos
Cool plants in a hot world

Arctic and alpine ecosystems are heavily affected by the rapidly warming climate, and numerous research projects and initiatives have investigated biodiversity changes due to current climate change. I will give an overview of several past and present projects, including: very long-term repeat plant surveys on European mountain summits and in the Swiss canton of Grisons (Summitflora, since 1835; Flora Raetica, since 1932) ; detailed global long-term monitoring of vegetation on mountain summits (GLORIA, since 2001) ; experimental warming in tundra ecosystems (International Tundra Experiment ITEX, since 2014) ; plant functional traits in response to temperature gradients and warming ; remote sensing approaches to document vegetation change in mountain regions. But beyond climate warming, I will also address other important factors influencing alpine plant biodiversity, such as land-use, related encroachment of woody plants, natural disturbances and tourism.

Pascal Lacroix - Institut des Geosciences de l'Environnement, Grenoble

Recent large landslides in high mountains: characteristics, causes, and lessons for the future

Recent landslides in high mountains like in Rasuwa, Nepal; Blatten and La Bérarde in the Alps; and Vallunaraju in the Andes have prompted society to examine their causes, specific characteristics, recurrence patterns, predictability, and the vulnerability of mountain regions to such events. These questions will guide this presentation, based on the scientific insights of a broad community of researchers working on these topics.

Mathilde Defourneaux - Laboratoire d'Ecologie Alpine, Chambéry

Title to come

Abstract to come

Philippe Choler - Laboratory of Alpine Ecology, Grenoble & Jérôme Poulenard, Mountain Environments, Dynamics and Territories Laboratory, Chambéry

Interpreting the landscape : discovery of the Lautaret pass as a particularly suitable research site ; climate, ecology, lithology, researches

Simon Gascoin - Centre for Space Studies of Biosphere, Toulouse **Snow: A Key Driver of Alpine Ecosystems**

The snowpack that accumulates in the mountains each year is a valuable natural water reservoir for humans, as it retains winter precipitation and releases it in spring at just the right time to irrigate crops. Furthermore, the snowpack acts as a powerful thermal insulator, regulating soil temperature and influencing the phenology of high-altitude vegetation. Climate change, which disrupts the accumulation and melting of the snowpack, is therefore upsetting the functioning of mountain catchments and ecosystems. We will examine how recent advances in the field of space-based observation are enabling us to characterise changes in the snowpack and to better understand its hydrological and ecological impact in alpine environments.

Felix de Tombeur - Centre for Functional and Evolutionary Ecology, Montpellier **Silicon dynamics in the Earth's Critical Zone: an eco-geo-chemical journey**

The Earth's Critical Zone emerges from the fascinating interplay between rocks, sunlight, air, water, and life. Silicon (Si), the second most abundant element in the Earth's crust, is a great example of the interactions between the living and the non-living. For a long time, Si was mainly considered a purely "geochemical element." We now know that its cycle is strongly influenced by living organisms. From terrestrial to marine ecosystems, many organisms take up Si and use it for a range of ecophysiological functions. This biological accumulation, in turn, affects how Si cycles through ecosystems and across the Earth's surface. In this seminar, I will present a series of studies exploring Si dynamics in terrestrial ecosystems and its ecophysiological roles in organisms, with a particular focus on soil-plant interaction.

Jardin du Lautaret - Grenoble Alpes University - National Center for Scientific Research - Observatory of Universe Sciences, Lautaret pass

Ever since its establishment in 1899 by the University of Grenoble, the Jardin du Lautaret (Lautaret Garden) has had a dual purpose: welcoming the public and conducting scientific research. The scientific study of natural mountain environments is more relevant than ever in the context of increasing global change – that is, the effects of climate change and human activities on ecosystems. The garden therefore welcomes researchers from all over the world every year, in both summer and winter, who come to study the effects of these changes on mountain ecosystems.

The research carried out at Lautaret can be categorised into three main areas: the biology of adaptations and evolutionary ecology, climate and ecosystem functioning, and the dynamics of mountain regions.