

PSC Symposium 2025

Harnessing Machine Learning for Breakthroughs in Plant and Environmental Sciences

www.plantsciences.uzh.ch/en/Outreach/Symposia/Symposium-2025.html

Machine Learning Applications in Environmental Sciences

Thursday, March 13, 2025

Location: ETHZ, HG F30 (Audimax)

09:00 Welcome message by Dr. Bojan Gujas

09:10 **Keynote Lecture: Machine Learning in Plant and Environmental Sciences**
Prof. Dr. Jan Dirk Wegner, UZH/ETHZ, Switzerland

REMOTE SENSING

09:45 **Remote Sensing Applications for Biodiversity Monitoring**
Dr. Claudia Rösli, UZH, Switzerland

10:15 **Automated Forest Inventory: Analysis of High-Density Lidar Point Clouds with Visual AI Tools**
Prof. Dr. Konrad Schindler, ETHZ, Switzerland

10:45 **Remote Sensing Foundation Models for Ecological Applications**
Dr. Elena Plekhanova, WSL, Switzerland

11:00 Coffee Break

MACHINE LEARNING IN ECOLOGICAL MONITORING

11:20 **Data Mining and Machine Learning in Macro-Ecological Research**
Prof. Dr. Niklaus Zimmermann, WSL, Switzerland

11:55 **Multispecies Deep Learning to Map the Distribution of the Swiss flora**
Dr. Philipp Brun, WSL, Switzerland



12:10 **Machine Learning-Based Phenotyping Method PlantServation Reveals Seasonal Pigment Fluctuation in Diploid and Polyploid Arabidopsis**
Prof. Dr. Kentaro Shimizu, UZH, Switzerland

12:35 Lunch Break

13:40 **From Satellites to Smartphones: Combining Citizen Science and Earth Observation to Map Global Plant Trait Distributions at High Resolution**
Daniel Lusk (Prof. Dr. Teja Kattenborn Group), University of Freiburg, Germany

14:15 **New Forest Monitoring Perspectives: Tree Species and Health Identification Using AI-Powered Earth Observations**
Dr. Mirela Beloiu Schwenke, ETHZ, Switzerland

14:50 **Data-driven Predictions of Terrestrial Photosynthesis**
Prof. Dr. Benjamin Stocker, UNIBE, Switzerland

15:25 **Upscaling N₂O Emissions from Field to Farm Scale with Ecosystem Flux Measurements and Remote Sensing**
Lorenz Allemann (Prof. Dr. Nina Buchmann Group), ETHZ, Switzerland

15:40 Coffee Break

16:00 **Mapping Alpine Hazards by Using Satellite Imagery and Deep Learning Techniques**
Dr. Andrea Manconi, SLF, Switzerland

16:30 **Machine Learning Across Ecosystems: From Camera Traps to Chemical Risk Assessment**
Dr. Marco Baity Jesi, EAWAG, Switzerland

Machine Learning Applications in Plant Sciences

Friday, March 14, 2025

Location: ETHZ, HG D7.2

09:00 Welcome message by Dr. Bojan Gujas

MACHINE LEARNING APPLICATIONS IN PLANT BIOCHEMISTRY & GENOMICS

09:05 **Leveraging Machine Learning and Genome-Scale Metabolic Modelling for Enhanced Insights into Plant Metabolism**
Dr. Óscar Manuel Lima Dias, University of Minho, Portugal

09:40 **Leveraging Coevolutionary Insights and AI-Based Structural Modeling to Unravel Receptor-Peptide Ligand-Binding Mechanisms**
Dr. Simon Snoeck (Prof. Dr. Cyril Zipfel Group), UZH, Switzerland

10:00 **Genomic Prediction in the Machine Learning Era: Results, Reflections, and a Call for Improved Handling of Confounder Effects**
Dr. Ciarán Kelly, School of Pharmacy and Biomolecular Sciences, Ireland

INNOVATIONS IN IMAGE ANALYSIS FOR PLANT CELL BIOLOGY

10:35 **Machine Learning Tools for Microscopy Image Analysis in Plant Cell Biology**
Dr. Célia Baroux, UZH, Switzerland

11:10 Coffee Break

11:30 **Plantseg to Fractal: From 3D Image Segmentation to Automated Image Analysis at Scale**
Dr. Lorenzo Cerrone, UZH, Switzerland

12:00 **Deep Learning for Stomata Segmentation**
Hongyuan Zhang (Dr. Diana Santelia Group), ETHZ, Switzerland

12:15 Lunch break

MACHINE LEARNING IN PLANT STRESS AND HEALTH MONITORING

13:20 **Leveraging Machine Learning to Identify Stress in Plants Using Their Electro-Physiological Response**
Dr. Elena Najdenovska, Haute École d'Ingénierie et de Gestion du Canton de Vaud (HEIG-VD), Switzerland

13:50 **Identifying Microbiota Community Patterns Important for Plant Protection Using Synthetic Communities and Machine Learning**
Dr. Julien Massoni (Prof. Dr. Julia Vorholt Group), ETHZ, Switzerland

MACHINE LEARNING APPLICATIONS IN CROP SCIENCE

14:20 **Non-destructive (proximal) Sensing of Crop Canopies: How to Integrate Agronomic Prior Knowledge to Train General Models based on Sparse Data?**
Dr. Andreas Hund (Prof. Dr. Achim Walter Group), ETHZ, Switzerland

MACHINE LEARNING FOR EVOLUTIONARY AND CONSERVATION BIOLOGY

15:00 **(Semi)Supervised and Reinforcement Learning Models for Evolutionary and Conservation Biology**
Dr. Daniele Silvestro, ETHZ, Switzerland / University of Gothenburg, Sweden

15:35 **Ten Years of PlantCLEF/LifeCLEF: Scientific Challenges to Improve Plant Recognition**
Prof. Dr. Henning Müller, Fachhochschule Westschweiz (HES-SO), Switzerland

16:00 **GeoLifeCLEF Challenge: Species Presence Prediction Based on Occurrences Data and High-resolution Remote Sensing Images**
Dr. Benjamin Deneu, WSL, Switzerland

ABSTRACTS LINK:

