SWISS POLAR INSTITUTE



Operational Director EPFL Valais Wallis















EPFL Ronquoz 21 by Herzog & De Meuron









SWISS POLAR INSTITUTE



Vice President for Operations EPFL





Swiss Polar Day 2023

Climate & Energy at EPFL

Vice President for Operations

Sion – Alpole September, 15th 2023

École polytechnique fédérale de Lausanne



EPFL at glance





***6'400** Employees (incl. Phd)



EPFL Associated campuses

Neuchâtel – Microcity

Microengineering and nanotechnologies Advanced micro-manufacturing

Fribourg – Smart Living Lab

Building technology and sustainable architecture

Sion – Energypolis Industrial energy, green chemistry Environmental engineering Biotechnology, bioengineering

Geneva – Campus Biotech

Neuro <u>X</u> Institute Blue Brain Project Bio- and neuroengineering (Wyss center)





EPFL A dynamic campus



Environmental Engineering Inst. From hydrology to AI for the environment

Hydrology

- Prof. T. Battin
- Prof. I. Altshuler
- Prof. S. Bonetti
- Prof. M. Lehning

Soil

• Prof. M. Aeppli

Extreme Environments

- Prof. J. Chappellaz
- Prof. J. Schmale

• Al

• Prof. D. Tuia



Solution Research: a priority during the next years



Neuroscience and engineering



Sustainability at all levels

Interconnection between education, research, innovation and campus operations



go.epfl.ch/sustainability_strategy



Released on February 23, 2023

EPFL Solutions4Sustainability S4S : Selected L-scale proposals



20



Prof. Agrawal (EPFL Valais Wallis)

Energy-efficient CCUS at the EPFL Campus for Sustainable and Circular Economy



Prof. Paolone

Renewable-supplied data centers integrating heating and cooling supply of local districts

ETH zürich

CGES

Coalition for Green Energy & Storage

PAUL SCHERRER INSTITUT



Power-to-X: Expertise in the ETH Domain







Swiss Polar Day 2023

Enjoy the visit of Alpole

Matthias Gäumann VP for Operations

École polytechnique fédérale de Lausanne

Sion – Alpole September, 15th 2023

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Presentation of ALPOLE groups







A few words about research at ALPOLE

(A center of the Institute of Environmental Engineering – IIE,

School of Architecture, Civil and Environmental Engineering - ENAC)

EPFL ALPOLE heads of units



Prof. Devis Tuia ECEO



Prof. Julia Schmale EERL



Prof. Tom Battin RIVER



Prof. Michael Lehning CRYOS



Prof. Ianina Altshuler MACE



Prof. Meret Aeppli SOIL



Prof. Sara Bonetti CHANGE



Prof. Jérôme Chappellaz **SENSE**

Mission

- Understand and predict environmental change in high-altitude and high-latitude regions undergoing rapid and unprecedented transformations
- Explore mitigation and adaptation strategies relevant for ecosystems, the built environment and human well-being



EPFL Poles and mountains (but not only)



Catchment hydrology



Soil biogeochemistry

Snow processes / REN





Alpine river biophys-chem.



Cryosphere microbiome







Sensing greenhouse gases



Laboratory of Smart Environmental Sensing in Extreme Environments (SENSE)

Prof. Jérôme Chappellaz

Ferring Pharmaceutical Margaretha Kamprad Chair



SENSE lab - Research

Improving the monitoring and understanding of **greenhouse gas** biogeochemistry in polar and high-altitude environments

Research themes

- Biogeochemistry of greenhouse gases in aquatic environments
- Air-Sea exchanges of greenhouse gases
- Technological developments

Methodology

- Sensing using laser spectrometry
- Isotope geochemistry
- Field observations















Laboratory of Cryospheric Sciences

Prof. Michael Lehning Joint WSL/EPFL appointment Dr. Hendrik Huwald





Extreme Environments Research Lab (EERL)

Julia Schmale Ingvar Kamprad Chair

EERL launch: Dec. 2019 Location: Sion, ALPOLE

Credit: L. Favre, EERL

15.09.2023

Whatwedo

The EERL aims to create fundamental and integrated understanding of climate-relevant processes in extreme environments, such as polar and alpine regions. We achieve this by investigating the composition of the atmosphere, in particular aerosols, and interactions with the cryosphere, ocean, land and human activities.

EPFL Research Topics



Adpated from Schmale et al., Nat. Clim. Chang., 2021

CCN - cloud condensation nuclei, INP - ice nucleating particles

EPFL Research Topics

- Aerosols originate from many different anthropogenic and natural sources.
- These sources are changing with climate change.
- Their chemical composition and size determines their specific effects on climate through direct interaction with radiation and cloud formation.



Adpated from Schmale et al., Nat. Clim. Chang., 2021

One example: ARIofMELT expedition

June 2023

Deploy lab tethered balloon to understand aerosol population at cloud level. Necessary, because of temperature inversions.

Deploy lab container for very specific and heavy instrumentation.

Photo credit: Oden Crew

EPFL Thanks for your attention!



Julia.schmale@epfl.ch

RIVER Lab

Climate-change impacts on river ecosystem structure and function

Glacier shrinkage Microbiome and biofilms Ecosystem processes and biogeochemistry Global carbon cycling

Expeditions Large-scale experiments Bench-scale experiments Data science and modelling

