

# Conference

## High Altitudes meet High Latitudes: Globalizing Polar Issues

Crans-Montana, Switzerland  
September 11-12, 2017

SWISS POLAR  
INSTITUTE



VALAIS  
WALLIS



Swiss Federal Institute for Forest,  
Snow and Landscape Research WSL

ETH zürich



Geneva  
Global

Unil  
UNIL | Université de Lausanne



Communauté  
UNIVERSITÉ Grenoble Alpes

UArctic globalarctic

## Organizing committee

Martin Beniston	<a href="mailto:martin.beniston@unige.ch">martin.beniston@unige.ch</a>
Jérôme Chappellaz	<a href="mailto:jerome.chappellaz@univ-grenoble-alpes.fr">jerome.chappellaz@univ-grenoble-alpes.fr</a>
Alexey Ekaykin	<a href="mailto:ekaykin@aari.ru">ekaykin@aari.ru</a>
Suren Erkman	<a href="mailto:suren.erkman@unil.ch">suren.erkman@unil.ch</a>
Matthias Finger	<a href="mailto:matthias.finger@epfl.ch">matthias.finger@epfl.ch</a>
Philippe Gillet	<a href="mailto:philippe.gillet@epfl.ch">philippe.gillet@epfl.ch</a>
Lassi Heininen	<a href="mailto:lassi.heininen@ulapland.fi">lassi.heininen@ulapland.fi</a>
Eric Hoesli	<a href="mailto:eric.hoesli@epfl.ch">eric.hoesli@epfl.ch</a>
Michael Lehning	<a href="mailto:michael.lehning@epfl.ch">michael.lehning@epfl.ch</a>
Marina Kalinina	<a href="mailto:m.r.kalinina@narfu.ru">m.r.kalinina@narfu.ru</a>
Vera Slaveykova	<a href="mailto:vera.slaveykova@unige.ch">vera.slaveykova@unige.ch</a>
Ksenia Tatarchenko	<a href="mailto:ksenia.tatarchenko@unige.ch">ksenia.tatarchenko@unige.ch</a>
Natacha Tofield-Pasche	<a href="mailto:natacha.tofield-pasche@epfl.ch">natacha.tofield-pasche@epfl.ch</a>

## Program

**Monday, September 11<sup>th</sup> 2017**

09.00-10.00	Welcome coffee
10.00-12.00	OPENING - Plenary Session  <b>Jean Jouzel</b> Former vice-president of IPCC, Nobel Price for Peace 2007, gold medal of CNRS  <b>Jacques Melly</b> Conseil d'Etat, Canton of Valais
12.00-13.00	Flash talks (20x2')
13.00-14.00	Standing Lunch + poster session
14.00-16.00	4 Workshops (parallel) <i>Water Resources</i> <i>Focus on Chemical Pollution</i> <i>Tourism</i> <i>Paleogeography</i>
16.00-16.30	Coffee break
16.30-17.30	Round Table <i>Security and Risk Management</i>
16.30-17.30	Round Table <i>Arctic Resources</i>
18.30-19.30	Free time
19.30-20.00	Aperitif
20.00-22.00	Dinner

## ***Tuesday, September 12<sup>th</sup> 2017***

08.30-10.30	4 Workshops (parallel) <i>Evolution of Permafrost</i> <i>Ecology and Biodiversity</i> <i>Ice and snow Processes</i> <i>ACE</i>
10.30-11.00	Coffee break
11.00-12.00	Round Table <i>Remoteness and Infrastructure</i>
12.00-13:00	Flash talks (20x2')
13:00-14.00	Standing Lunch + poster session
14.00-15.00	Round Table <i>Awareness</i>
15.00-16:00	Plenary Session: ACE presentation (results)
16.00-16.30	Coffee break
16.30-17:30	Presentations: others projects <i>Ice Memory</i> <i>Arcticpedia</i>
17.30-18:00	Conference Closing <b>Prof. Philippe Gillet</b> Director of Swiss polar Institute

## Abstracts

### Workshops

#### **1. WATER RESOURCES** - Martin Beniston (UNIGE)

*Converging responses of high altitude and high latitude hydrological systems to climatic change*

Climatic change at both high altitudes and high latitudes will be accompanied not only by overall warming in all seasons, but by shifts in the seasonality of precipitation in many instances. One particular area of convergent response of river systems in both high altitudes and high latitudes will be the impacts of a warming climate on the behavior of the cryosphere, in particular snow (duration and quantity) and glaciers (speed of retreat, volume loss). These changes in the cryosphere will have obvious and often significant impacts on the quantity and seasonality of surface flows both in the Arctic zone and in mountain ranges where snow and ice is still today an important component of the hydrological cycle. This workshop will bring together speakers who are experts in Canadian Arctic climate and hydrological processes, and those who have focused much of their recent research on high mountains such as the European Alps, but also the Andes and the Central Asian mountains, to provide the conference with estimates of past, current and future changes in hydrology in these regions.

#### **Guest Speakers :**

John Pomeroy : *Talk Title tba*

Erika Coppola : *Talk Title tba*

Laxmi Sushama : *Talk Title tba*

#### **2. FOCUS ON CHEMICAL POLLUTION** - Vera Slaveykova (UNIGE)

*Environmental Threats in Changing Alpine and Polar Regions: Focus on Chemical Pollution*

This workshop focuses on two major environmental issues common to both alpine and polar regions: climate change, pollution and their interaction. Despite their specificity, the alpine and polar regions share characteristics making them vulnerable to anthropogenic threats. For examples, they concentrate different chemicals used at mid-altitudes. Climate change not only directly affects the alpine and polar environment but also interacts synergistically and exacerbates the impact of other anthropogenic threats. Increasing evidences suggest that the melting of ice and snow, as well as thawing the glaciers and permafrost result in a release of the stored chemicals and could increase their risk for environment and human health.

The workshop has wide and interdisciplinary perspectives on the chemical pollution in the alpine and polar regions with specific emphasis on the contaminant fate and effect on the ecosystem and human health in changing environment.

Contributions at multiple scales – from molecular studies to global cycle - of the fate and effects of both legacy (e.g. POPs, mercury) and emerging contaminants (e.g. perfluoroalkyl sulfonamide) and their environmental impacts are welcomed. In addition, we welcome contributions on contaminant risk assessment and mitigation under climate changes scenarios. Discussing the similarities and differences of the contaminant issues in the Alpine and polar regions, sharing the scientific lessons

profitable for the development of an efficient long-term management and for improved environmental and human health protection is also expected.

**Guest Speakers :**

Marc Amyot: *Mercury in the changing Arctica*

Arja Rautio: *Climate Change in Arctic, Environmental Contamination and Human Health*

Jérôme Fort: *Spatial ecotoxicology : tracking large scale mercury contamination of the avian community in a changing Arctic*

Dmitrii Kosyakov : *Talk Title tba*

**3. TOURISM** - Christophe Clivaz (UNIL), Andrian Vlachov (EUSP, Russia)

*Convergence and Divergence between Tourism Issues in the Arctic and Alpine Areas*

During the workshop, we will explore possible convergences between tourism issues in the Arctic and Alpine areas. Both these regions offer great tourism opportunities featuring pristine nature, diverse natural and cultural landscapes and unique emotional experiences. In the same time, the Arctic and the Alpine regions experience partly similar kind of tourism-related problems such as limited accessibility, hindered logistics, community impact etc. In addition to that, these two regions are directly affected by ongoing climate change threatening to destroy vulnerable landscapes and local communities. By putting together researchers studying tourism development in the Arctic and Alpine areas, we hope to gain a profound understanding of the high latitude and high-altitude tourism and possibly develop common approaches to studying these areas.

**Guest Speakers :**

Albina Pashkevich: *Challenges and prospects of developing tourism in the Russian Arctic*

Olof Stjernström : *Talk Title tba*

Tobias Lüthe: *Talk Title tba*

Thomas Bauch: *Talk Title tba*

Martine Rebetez : *Impact of decreasing snowfall and snow pack on alpine tourism*

**4. PALEOGEOGRAPHY AND CLIMATE CHANGE** - Jérôme Chappellaz (LGGE)

*Paleogeography and Climate Change*

Under the pressure of current climate change, landscapes of polar and mountain regions are profoundly affected. It leaves imprints on cryospheric features such as glacier volume and extent, permafrost as well as the extent and duration of snow cover. But other features evolve strongly, such as vegetation type, fauna and human occupation. This session will address temporal information provided by different archives such as ice cores or lake records, coming from both polar and mountain regions, allowing one to put in a temporal perspective the current evolution of these environments.

**Guest Speakers :**

Vladimir Ya. Lipenkov: *Air content of ice - a useful source of paleoenvironmental information in polar and mountain ice cores*

Vladimir Mikhalenko : *Glaciological changes in the Caucasus mountains and their link with global climate*

Bruno Wilhelm : *Talk Title tba*

## **5. EVOLUTION OF PERMAFROST - Reynald Delaloye (Uni FR)**

*Evolution of Permafrost in High Latitudes and High Altitudes*

What is changing in the far north? What is changing in the Alps or in other mountain ranges over the world? What do we know and what is unknown? What about the consequences on the carbon cycle, the erosion of coasts, the instability of mountain slopes? Are critical feedback or cascading mechanisms to be point out? These are some of the questions the workshop is intending to tackle about the ongoing evolution of permafrost in the high latitudes or high altitudes and its consequences.

### **Guest Speakers :**

Britta Sannel : *Lowland permafrost in subarctic regions - current status and future challenges*

Ludovic Ravanel : *The role of permafrost in rockfall triggering, a decade of research in the Mont Blanc massif*

Hugues Lantuit : *The importance of water content/soil moisture monitoring for polar and high mountain permafrost studies*

Jeannette Noetzli : *Trends and strategies of permafrost long-term observation*

Christian Hauck : *Water/soil moisture and (mountain) permafrost*

Reynald Delaloye : *Moving frozen slopes*

## **6. ECOLOGY AND BIODIVERSITY - David Grémillet (CEFE)**

*Challenges to ecological research at high latitude/altitude*

As Alexander von Humboldt climbed Mount Chimborazo in 1802, he recognized that alpine and polar areas share a series of environmental constraints, which shape the ecology of organisms living in these harsh areas. Over two centuries later, global change is drastically and rapidly modifying such conditions, as well as ecological, evolutionary and ecosystem processes within high altitude and high latitude regions. Modern ecological research, on the basis of long-term monitoring programmes, high-tech measurements and experiments, as well as elaborated modelling work, is capable of identifying, rating and forecasting the varied impacts of shifting environmental conditions upon the biosphere in alpine and polar regions. This session will draw from the latest ecological research, to illustrate these exciting scientific advances, thereby stressing parallels, but also contrasts, between high altitude/latitude natural and anthropogenic processes.

### **Guest Speakers :**

Ruben Sommaruga: *Consequences of glacial retreat and meltwaters for the biota of lakes*

---

Helen Wheeler: *What are the needs for effective pan-arctic wildlife monitoring under climatic, environmental and socio-economic change*

Kyle Elliott: *Extreme energetics: climate change and physiological limits of animals in cold environments.*

Dorothee Ehrich: *Talk Title tba*

Signe Normand: *Talk Title tba*

Sonja Wipf: *Faster, taller, more – patterns and drivers of change in Arctic and alpine plant communities*

## **7. ICE AND SNOW** - Koni Steffen (WSL), Michael Lehning (EPFL/SLF) *Ice and Snow Processes for Reliable Climate Change Predictions*

Most ice masses on earth have been built-up from snowfalls via sintering and firn formation. Our understanding on the relevant processes of snow deposition and snow - firn dynamics is incomplete because the physical mechanisms behind e.g. drifting and blowing snow or water transport in snow and firn are very complicated. It is increasingly recognized that the complex physics need to be better understood to make more reliable predictions on future polar and high-mountain snow and ice mass balances. This session reviews the current knowledge on snow and ice processes and their relevance in the context of climate change predictions. The grand challenges are presented and it is shown how a combination of remote (satellite) and in situ observations together with modelling can advance our knowledge of these processes.

### *Ice Sheet Mass Balance of Greenland and Antarctica and their Uncertainties*

Over the past quarter of a century, the Arctic has warmed more than any other region on Earth, causing a profound impact on the Greenland ice sheet and its contribution to the rise in global sea level. The total ice mass loss in Antarctica is uncertain due to the large extent of the ice sheet and the uncertainties in precipitation. Ice loss in West Antarctica is accelerating due to the warm seawater melting on the ice shelves. Assessing the current knowledge of the contribution of the Antarctic and Greenland ice sheets to global and regional sea-level rise is of prime importance now and for the coming decades. We will focus on quantifying the uncertainties, and understanding and resolving the current discrepancies among the estimates from different observational and modelling methods. The loss of ice can be partitioned into processes related to surface mass balance and to ice discharge, which are forced by internal or external (atmospheric/oceanic/basal) fluctuations. Regardless of the measurement method, observations over the last two decades show an increase in ice loss rate, associated with speeding up of glaciers and enhanced melting. However, both ice discharge and melt-induced mass losses exhibit rapid short-term fluctuations that, when extrapolated into the future, could yield erroneous long-term trends.

### **Guest Speakers :**

Michiel van den Broeke: *Tipping points in the melt behaviour of ice caps and ice sheets*

Rebecca Mott: *Talk Title tba*



Ghislain Picard: *Talk Title tba*

Eric Rignot : *Talk Title tba*

Isabella Velicogna : *Talk Title tba*

## **8. ANTARCTIC CIRCUMNAVIGATION EXPEDITION - David Walton (ACE)**

### *Highlights from Southern High Latitudes*

The first project of the Swiss Polar Institute, the Antarctic Circumnavigation Expedition (ACE) will investigate the Southern Ocean, the sub-Antarctic islands and their interactions. This unique expedition will collect data all around the continent in a single summer from December 2016 to March 2017. With a total of 22 international and interdisciplinary projects, we selected only the projects that have a link with high altitude. These projects aim at better understanding the forcing of climate change, at reconstructing climate from ice cores, or at studying the evolution of biodiversity on isolated islands, as well as the potential of organisms to disperse and colonize newly deglaciated sites.

### **Guest Speakers :**

Rafel Simo: *Talk Title tba*

Julia Schmale: In Search of the Preindustrial Atmosphere

David Pearce: *Talk Title tba*

Elizabeth Thomas: Reconstructing past climate from sub-Antarctic ice cores

## **Round Tables**

### **1. SECURITY AND RISK MANAGEMENT - Lassi Heininen (University of Lapland)**

#### *Thematizing Arctic Security, and (Re)defining the New Nexus of Security Risks in the Globalized Arctic*

Long-range pollution and climate change are global issues, environmental challenges or wicked problems. Their causes and impacts are seen and will be manifested differently in various parts of the world. At the same time, when this global – local relationship is very important, the impacts will need to be dealt with regionally and locally. This panel on Security and Risk Management aims to discuss on how the security nexus of the 21<sup>st</sup> century's globalized Arctic, including stability-building and risk management, is thematised and reconceptualised, and why the Arctic has become geopolitically stable and peaceful. It looks at the human dimension of security, exploring how rapid environmental changes and grand challenges, much due to long-range pollution and climate change, can threaten people(s), local communities and even states, as well as cause changes in security discourses and premises. The panel, consisted of social scientists, analyses on how environmental security first, and then human security were raised and implemented, as well as how the high geopolitical stability was achieved. Followed from this, it argues, and invites the audience to discuss and respond, that a precondition for this was a change in security premises of the Arctic states. It will then make some comparisons on the one hand, between some local communities in the Alps and coastal communities in Iceland, and on the other hand, between the state of security of the 'global' Arctic, without real (nuclear) disarmament, to that of the 'demilitarized' Antarctic, determined

by the International Antarctic Treaty System. Finally, the panel concludes by drawing out both differences and similarities on how security, as well as risk management, is thematised and (re)defined in these three areas.

**Guest Speakers :**

Gunhild Hoogensen Gjølrv  
Audur Ingolfsson  
Teemu Palosaari  
Sergey Markov

**2. ARCTIC RESOURCES - Matthias Finger (EPFL)**

*Arctic Resources: Possible Scenarios of Exploitation*

This round-table will address the issue of Arctic resources from an interdisciplinary perspective. It will cover the main relevant resources, namely oil, gas, coal, minerals and fisheries. We will look at both the available potential of such resources as well as at the conditions for their exploitation, as influenced by global warming, economics, geopolitics and social issues. The purpose of this workshop is to get a thorough understanding about the likelihood of these resources becoming exploited on an industrial scale along with possible scenarios. The round-table will feature experts and academics specialized in geopolitics, resources dynamics, climate change and geology.

**Guest Speakers :**

Andrey Krivorotov  
Klaus Dodds  
Markus Kroger

**3. INFRASTRUCTURES - Ksenia Tatarchenko (UNIGE)**

*Remoteness and Infrastructure: Knowing, Living and Imagining the Environments of Polar and Alpine Regions*

The goal of this round-table is to create a dialogue that gives center stage to the questions about human/nature relationships. Whereas the notions of “locality” and “globalization” are the watchwords of all present-day discussions on climate change, we will consider the constitutive elements of the human/nature relationships hinging upon a multiplicity of spatial and temporal scales. Instead of reinforcing traditional dichotomies, such as urban communities and rural areas, humanities and natural sciences, scientific exploration and artistic representation, we will use the concepts of “remoteness” and “infrastructure” as they play out across national, geographical, and disciplinary boundaries. Our lines of inquiry bring together the processes of knowing, living and imagining the natural environments of polar and alpine regions: How does one live a “good life” in the extreme conditions of harsh environments? What connects the Socialist revolution, the conquest of nature, and the vocabulary of the international scientific community? Why does the phrase “climate change” have the potency to hide as much as it reveals about changes on the ground?

**Guest Speakers :**

Peter Schweitzer  
Pey-Yi Chu  
Ekaterina Kalemeneva  
Fabien Arnaud Laboratoire

#### **4. AWARENESS - Marina Kalinina (NARFU)**

##### *Developing Awareness of Changing Arctic*

The round-table discussion includes the issues of raising awareness of changing Arctic in the light of the region`s affecting the rest of the world. Invited experts will introduce their perspectives in cooperation and communication of Arctic science on the level of international arctic organizations and networks; role of teaching and teacher education in the Arctic as a response to the challenges of diverse population, small communities and a need to empower Arctic inhabitants and take a lead on their own lives and environments; as well as best practices of circumpolar education cooperation provides by University of the Arctic (UArctic) member institutions.

##### ***Guest Speakers :***

Lars Kullerud  
Tuija Turunen  
Peter Sköld  
Kirsi Latola  
Gerald Anderson  
Paul Arthur Berkman  
Terry Callaghan