GEO GNOME
OBSERVING MOUNTAIN ENVIRONMENTS

GEO-GNOME Workshop
"Essential Climate Variables for Observations in Mountains"

24-26 June 2019
UniS Building, Rooms A019, A024 and A027, University of Bern I Bern, Switzerland

Draft Program (version 30.5.2019)

Background

At the GEO-GNOME Status and Scoping Workshop held, in Bern in May 2018[1], key objectives and tasks listed on its work plan 2017-2019 were revised, and new research activities to support a scientific basis for Earth observation (EO) in mountains were discussed (see also Adler et al, 2018[2]). The importance of climate as one key driver of environmental change in mountains, with relevant consequences for social-ecological systems, was reiterated. Given already existing initiatives on climate variables for observations and modelling more generally, an opportunity was identified to focus attention on mountain-specific needs on key variables for observations and modelling. A transect network of in-situ climate data over elevation gradients (Unified High Elevation Observing Platform, UHOP[3]), together with consistent time series of EO data, was suggested as a means to address key data gaps and to improve our understanding of processes of elevation-dependent warming (EDW) and elevation-dependent climate change (EDCC) in mountains, and support a systematic means for identifying and collecting new observation data.

Essential Climate Variables (ECVs) relevant for mountains was identified as a first starting point, which include not only "pure climate" variables (e.g. temperature, wind, etc.) but also other related geophysical variables such as land-cover, snow cover or soil moisture. From this starting point, collecting data on other environmental processes like natural hazards, water resources and ecosystem accounting, in addition and in relation to climate, would strengthen GEO-GNOME's ability to identify relevant data and information that meet the needs of management, policy and scientific research, and make this data discoverable and accessible via suitable data portals, such as the GEO-GNOME Global Earth Observation System of Systems (GEO-GNOME GEOSS, under development).

With the support from the **European Space Agency (ESA), Future Earth (FE), and the Mountain Research Initiative (MRI)**, the 2019 GEO-GNOME workshop aims at identifying and selecting ECVs required in high elevation contexts for the monitoring of 'mountain climate change' within mountain social-ecological systems, including considerations for integration between in-situ measurements, EO satellite data and modelling. The workshop also aims at identifying existing (or new) criteria and protocols for data collection and standards for these ECVs. An opportunity to explore and identify uses for ESA's existing datasets on ECVs within its Climate Change Initiative (CCI) programme, is also envisaged, with particular interest to explore use of datasets on Aerosol, Greenhouse gases (CO_2, CH_4), Ozone, Clouds, Land Cover, Soil Moisture, Fire, Glaciers, Biomass, among others, in the mountain context.

Key workshop objectives

1. Identify relevant physical processes which can lead to elevation dependent mountain climate change;
2. Identify EVs (essential variables) which are required to monitor and understand such processes and their consequences, i.e. relevant ECVs;
3. Discuss selected ECVs in the context of surface and in-situ observations (e.g. UHOPs), other EO (e.g. satellite) and numerical model simulations, and how information from these different sources can be combined or integrated to gain the most relevant information to improve understanding of key processes and prediction capacity for mountain climate change.

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[1] See http://www.mountainresearchinitiative.org/index.php/news-page-all/350-geo-gnome-status-and-scoping-workshop-bridging-data-gaps-in-mountain-environments

[2] See Adler et al (2018) - https://doi.org/10.1659/MRD-JOURNAL-D-8-00065.1

[3] See http://www.mountainresearchinitiative.org/index.php/activities/projects/geo-gnome

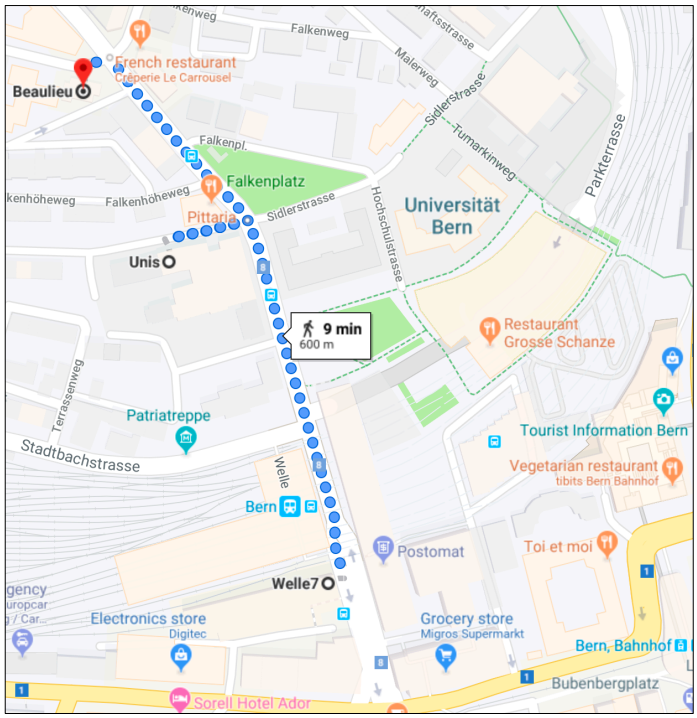
Expected outcomes and outputs

1. Identify and link mountain processes with their key ECVs and data requirements;
2. Identify ESA Climate Change Initiative (CCI) datasets utility, and explore complementing them with other sources of known data, networks, and information provided by individuals and/or research groups;
3. Workshop report detailing proceedings, outcomes, learnt experiences and next steps to be undertaken.

Location and getting to Bern

The workshop will take place at **UniS building**, University of Bern (Room A 027), a 5 minute walk from Bern main train station. Bern is easily accessible by air, road, or rail. If your flight lands in Zürich, Geneva, or Basel, there is great rail service to Bern with the Swiss rail company SBB (www.sbb.ch/en/).

From the main train station, follow the signs to "Welle 7" and exit via Stadtbachstrasse, turning north following Schanzenstrasse until you reach intersection with Schanzeneckstrasse and turn left. Entry to UniS is immediately around the corner (see the map provided or Google Maps).



Joint dinner

A joint dinner, hosted by MRI, will take place on Monday 24 June at 18:30, at the Restaurant Beaulieu (Erlachstrasse 3, Bern, www.restaurantbeaulieu.ch). Please note the location of the restaurant in the map provided.

Excursion

There will be a whole-day excursion to the Jungfraujoch High Altitude Research Station, in the Bernese Alps, on Wednesday 26 May (see program attached). This excursion offers a unique opportunity to learn more about high altitude research infrastructure for in-situ observations in the mountains, and to explore the research facilities and projects currently being undertaken at this location. Please bring suitable clothing and a jacket for mountain weather conditions, including sunglasses and a hat, and walking boots. The excursion is substantially subsidised by the workshop supporting organisations, however, to cover additional costs we request a small contribution of 50 CHF (paid in cash on the day) from attending participants. Due to reservations needed in advance, please register for the excursion when you register for this workshop.

Accommodation

As June is high season in Bern, we recommend you secure accommodation as soon as possible. Options can be viewed at the Bern tourism website (www.bern.com/en/where-to-stay/hotels). Hotel bookings need to be arranged by the participants directly.

Contact

For any additional questions, please contact MRI at mri@mountainresearchinitiative.org

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PLANNED WORKSHOP FORMAT AND PROGRAMME (DRAFT)

Monday 24 June	Tuesday 25 June
Plenary - Room A 027 **09:00 Welcome coffee (UniS foyer)** **09:30 Welcome and introductions** *Carolina Adler (MRI) & Elisa Palazzi (ISAC-CNR)* **09:45 Key processes in Elevation-Dependent Climate Change** Invited talk (30' talk and 15' discussion) 1. EDW context and the identification of processes – research developments within the last 4 years *Nick Pepin, University of Portsmouth*	**Plenary - Room A 027** **09:00 Recap Day 1 and plan for Day 2** **09:15 Definition and Scoring of ECVs** Group Discussion of ECVs identified for each process area from Day 1.
10:30 Coffee break	**10:30 Coffee break**
Plenary - Room A 027 **11:00 Key processes in mountain contexts (invited talks)** (15' each and 5' discussion) 2. Changing Snow and Ice, Glaciers and Permafrost in Mountain Systems – *Richard Essery, University of Edinburgh* 3. Ecological Changes in the Mountain Environment and Migrating Ecotones – *Christophe Randin, University of Lausanne* 4. Increased Cycling of Moisture in Mountain Systems– *Xiaofeng Li, Newcastle University* 5. Changes in Atmospheric Composition in High Altitude Regions – *Paolo Cristofanelli, CNR*	**Plenary - Room A 027** **11:00 Invited talks continue** 7. MRI Mountain Observatories Working Group – *Maria Shahgedanova, University of Reading (15')* 8. Climate change in mountain regions seen by field observations, earth observations and global and regional models – *Sven Kotlarski, Meteo Swiss; Elisa Palazzi; and Marc Zebisch, EURAC* **11:35 Orientation to break out groups** *Elisa Palazzi & Nick Pepin* **Rooms A019, A024 and A027** **11:45 Break out groups** Working groups will discuss how ECVs could be operationalised in ***1)*** *Field Observations;* ***2)*** *EO data;* ***3)*** *Models*
12:30 Lunch	**12:30 Lunch**
Plenary - Room A 027 **13:30 Considerations for essential variables in the mountain context** (15' and 5'discussion) 6. Insights in Essential Variables at national and regional scales - *Yaniss Guigoz and Gregory Giuliani, University of Geneva* **13:50 Orientation to break out groups** *Elisa Palazzi & Nick Pepin* **Rooms A019, A024 and A027** **14:00 Break out Groups** Identifying ECVs essential in the mountain context to understand change in process areas corresponding roughly to earlier talks *1) Mountain Cryosphere* *2) Moisture/Precipitation/Cloud Linkages* 3) *Atmospheric composition and transport processes* 4) *Ecological Zonation*	**Rooms A019, A024 and A027** **13:30 Break out Groups** Work continues in break out groups
15:45 Coffee break	**15:45 Coffee break**
Rooms A019, A024 and A027 **16:15 Break out Groups continue** Participants may change groups **Plenary - Room A 027** **17:15 Plenary** Summing up day 1 - groups present list of ECVs for their processes. **17:30 Close Day 1**	**Plenary - Room A 027** **16:15 Wrap up Day 2** Groups present their outcomes - lists of associated protocols for each ECV - Discussion **Final words and next steps** Carolina Adler & Elisa Palazzi
18:30 Workshop dinner in Restaurant Beaulieu	**17:30 Close Day 2 and end of workshop**

Wednesday 26 June **EXCURSION - Jungfraujoch High Altitude Research Station, Bernese Alps**
07:45 Meeting at Bern Railway Station Meeting Point *Departure at 8:04 - Arrival at Jungfraujoch at 11:05*
11:05 Welcome coffee
11:30 Introduction and tour through the Jungfraujoch Research Station *Prof. Silvio Decurtins* *President of the Board of the Foundation of the High Altitude Research Station Jungfaujoch – Gornergart (HFSJG)*
12:15 Lunch *Self-service Restaurant (at own cost)*
13:15 Tour through the Sphinx-Observatory *Prof. Silvio Decurtins* *President of the Board of the Foundation (HFSJG)* **14:15 Touristic tour** *Alpine Sensation, Ice Palace, Plateau, and glacier*
15:30 Coffee break *Self-service Restaurant*
16:00 Meeting point at the train station *Departure at 16:13 - Arrival in Bern at 19:24*