

GEO-GNOME Workshop

Essential Climate Variables for Observations in Mountains

24-26 June 2019 | Mittelstrasse 43, University of Bern | Bern, Switzerland

BACKGROUND AND OBJECTIVES

At the GEO-GNOME Status and Scoping Workshop held, in Bern in May 2018¹, key objectives and tasks listed on its GEO Work Programme 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, 2018²). 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, UHOP³), 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 collecting new observation data.

Identifying 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) 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 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 (CO₂, CH₄), Ozone, Clouds, Land Cover, Soil Moisture, Fire, Glaciers, Biomass, among others, in the mountain context.

The key objectives:

1. Identify and understand 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;
3. Discuss selected EVs 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 for understanding and predicting mountain climate change.

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 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/outputs:

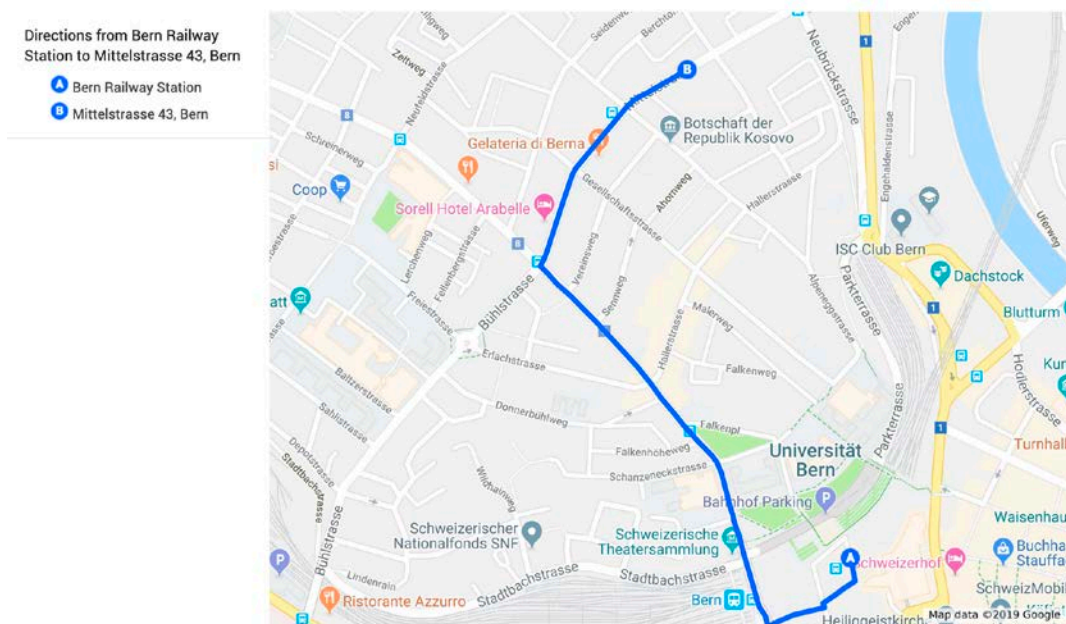
- Identify and link mountain processes with their key ECVs and data requirements;
- Identify ESA Climate Change Initiative (CCI) datasets utility, and explore complementing them with other sources of known data, networks, and information provided by individuals/groups;
- **Workshop report** detailing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

REGISTRATION

The workshop is free to attend, including breaks and workshop dinner on Monday evening, however we do encourage participants to mobilise their own resources for travel, accommodation and related expenses. The excursion organised on Wednesday after the workshop is optional, and partly at participants' own costs. There are only a limited number of spots available for participants, therefore registration to attend is required. Please complete the registration form by following [this link](#) to confirm attendance, by **31 May 2019**.

LOCATION AND GETTING TO BERN

The workshop will take place at **Mittelstrasse 43**, University of Bern, a 15 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/). At the main train station, follow the signs to "Welle 7" and exit via Stadtbachstrasse. Head North towards Schanzenstrasse. After 350 the name of street changes to Länggassstrasse. Follow Länggassstrasse for another 250 meters and then turn right onto Mittelstrasse. Follow the Mittelstrasse for 400 meters and you find the venue on the right side.



ACCOMODATION

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

Co-sponsored by

PLANNED WORKSHOP FORMAT AND PROGRAMME (DRAFT)

DAY 1 - Monday 24 June Rooms 120, 116 and 016	DAY 2 - Tuesday 25 June Rooms 120, 116 and 016	Wednesday 26 June EXCURSION
<p>09:00 Welcome coffee</p> <p>09:30 Welcome and introductions <i>Carolina Adler & Elisa Palazzi</i></p> <p>09:45 Invited talks</p> <p>1. Introduction to key processes in Elevation-Dependent-Warming and Broader Elevation-Dependent Climate Change - <i>Nick Pepin</i></p>	<p>09:00 Recap Day 1 and plan for Day 2</p> <p>09:15 Definition and Scoring of ECVs Group Discussion of ECVs identified for each mechanism from Day 1.</p>	<p>07:45 Meeting at Bern Railway Station Meeting Point <i>Departure at 8:04 - Arrival at Jungfrauoch at 11:05</i></p>
10:30 Coffee break	10:30 Coffee break	11:05 Welcome coffee
<p>11:00 Invited talks (continued)</p> <p>2. Changing Snow and Ice in Mountain System, Glaciers and Permafrost - <i>Speaker TBC</i></p> <p>3. Ecological changes in the mountain environment and migrating treeline - <i>Speaker TBC</i></p> <p>4. Increased Cycling of Moisture in Mountain System (Humidity, Cloud, Lapse Rates etc) –i.e. non-frozen part of the hydrological cycle - <i>Speaker TBC</i></p>	<p>11:00 Invited talks (continued)</p> <p>7. Climate change in mountain regions seen by field <u>observations</u>, <u>earth observations</u> and <u>global and regional models</u> – <i>Speakers TBC</i></p> <p>11:35 Orientation to break out groups <i>Elisa Palazzi & Nick Pepin</i></p> <p>11:45 Break out groups Working groups will discuss how ECVs could be operationalised in the field 1) Field Observations; 2) EO data; 3) Models</p>	<p>11:30 Introduction and tour through the Jungfrauoch Research Station <i>Research Station, Prof. Silvio Decurtins, President HFSJG</i></p>
12:30 Lunch	12:30 Lunch	12:15 Lunch <i>Self-service Restaurant (at own cost)</i>
<p>13:30 Invited talks (continued)</p> <p>5. Changing atmospheric circulation: Synoptic forcing and associated processes – <i>Speaker TBC</i></p> <p>6. Changes in atmospheric composition in high altitude regions – <i>Speaker TBC</i></p> <p>14:40 Orientation to break out groups <i>Elisa Palazzi & Nick Pepin</i></p> <p>14:45 Break out Groups Speakers will moderate poster discussion Identify ECVs which are essential in the mountain context to understand change in these process areas through both models and observations:</p> <p>1) <i>Mountain Cryosphere</i> 2) <i>Moisture/Precipitation/Cloud Linkages</i> 3) <i>Atmospheric composition and transport processes (including circulation)</i> 4) <i>Ecological Zonation – TBC</i></p>	<p>13:30 Break out Groups Work continues in break out groups</p>	<p>13:15 Tour through the Sphinx-Observatory</p> <p>14:15 Touristic tour <i>Alpine Sensation, Ice Palace, Plateau, and glacier</i></p>
15:45 Coffee break	15:45 Coffee break	15:30 Coffee break <i>Self-service Restaurant</i>
<p>16:15 Break out Groups (continued) Work continues in break out groups – participants may change groups</p> <p>17:15 Plenary Summing up - groups present list of ECVs for their processes and other comments.</p> <p>17:30 Close Day 1</p>	<p>16:15 Plenary Wrap up Day 2 Groups present their outcomes - lists of associated protocols for each ECV & discussion</p> <p>Final words and next steps <i>Carolina Adler & Elisa Palazzi</i></p>	<p>16:00 Meeting point at the train station <i>Departure at 16:13 - Arrival in Bern at 19:24</i></p>
18:30 Workshop dinner	18:00 End of Workshop	