Mountain Research Initiative (MRI) AGU 2019 splinter meeting

"Synthesis Workshop on Future Mountain Climate Change - From Elevation-Dependent Warming to Elevation-Dependent Climate Change"

(version 27 November 2019)

Wednesday 11 December 2019 I 09:00-12:30
600 Mason Street, San Francisco, USA

Organisers: Nick Pepin (University of Portsmouth, MRI Elevation-Dependent Warming WG), Aino Kulonen (MRI), Mathias Vuille (University at Albany) and Connie Millar (USDA Forest Service)

1. BACKGROUND AND OBJECTIVES

At the European Geosciences Union (EGU) General Assembly in 2015, a splinter meeting organized by the Mountain Research Initiative (MRI) explored options for future activities within the Elevation-Dependent Warming (EDW) Working Group[1]. Participants identified key research gaps on EDW, including the need to i) improve and homogenize observations and use better metadata; ii) derive results from single-site or transect measurements that are representative for large regions; iii) ensure a better combination of observations and model outputs; iv) understand the drivers of EDW and better characterize the critical elevation band(s) that may be most affected in the different regions and seasons; and v) improve models by increasing their spatial resolution and improving parameterization schemes. The results of the meeting were later published by this Working Group in *Nature Climate Change*[2] and have since been widely cited. At the EGU General Assembly in 2019, "*MRI Synthesis Workshop on Mountain Meteorology and Climatology: Drivers, Processes and Related Impacts*"[3] the work was continued with an aim to produce a review paper highlighting the special climatic setting of mountain environments around the globe and their particular vulnerability with regard to future climate change for the 6th Assessment Report of the IPCC.

During the AGU Fall Meeting 2019, a workshop will reconvene the EDW Working Group collective and new interested participants to continue and expand the work of the Working Group. Since the 2015 workshop there has been much more research on how present and future temperature trends may be elevation-dependent. Increasingly it is recognized that temperature changes do not act in isolation but are influenced by other variables and mechanisms. However there has been less detailed consideration of other climate variables such as snow cover, precipitation, humidity and cloud patterns. The workshop during the AGU Fall Meeting will broaden the perspective from Elevation-Dependent Warming to Elevation-Dependent Climate Change and consider i) the theoretical perspective behind expected changes in elevation profiles of variables other than temperature, and ii) what observations need to be developed to capture these expected changes (i.e. future practice). This workshop will also link to the AGU Fall Meeting 2019 sessions "*Mountain Weather and Climate in a Warmer World I and II*".

The key objectives for this side event are:

1) To start to explore the physical theories behind elevation dependent climate change and how various climate processes interact to create distinct elevation profiles in temperature, precipitation, snow cover, humidity, cloud, radiation fluxes etc.;

1 http://www.mountainresearchinitiative.org/activities/working-groups/elevation-dependent-warming
2 https://www.nature.com/articles/nclimate2563
3 http://www.mountainresearchinitiative.org/news-page-all/129-mri-news/2299-making-connections-at-the-egu-general-assembly-2019

2) Consider a possibility to produce a peer-reviewed publication (possible follow-up from the NCC Paper of 2015) presenting theoretical perspectives behind elevation-dependent climate change and needs of observational data to capture these changes;
3) To connect and enhance collaboration among scientists involved in the mountain meteorology and climatology research communities, including collaboration and activity among the MRI EDW Working Group with whom other research prospects and/or collaboration activities could be identified; and
4) Foster connection through exchange and networking.

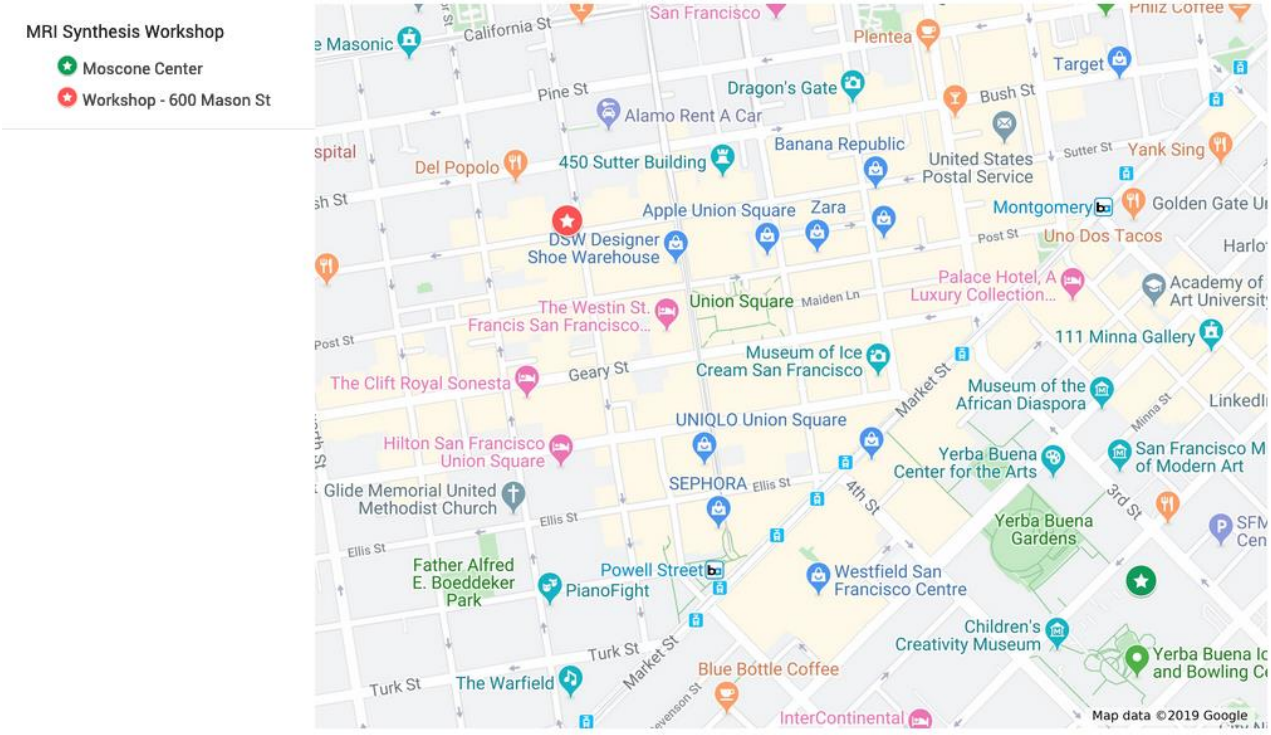
2. PLANNED WORKSHOP FORMAT AND PROGRAMME (DRAFT)

Wednesday 11 December 2019	
09:00 - 09:40	**Welcome and orientation (5 min)** *Aino Kulonen (MRI)* **Introduction to Elevation Dependent Climate Change (30 min)** *Nick Pepin (University of Portsmouth)* **Paper objectives and proposal for structure scope (5 min)** *Nick Pepin & Aino Kulonen*
09:40 - 10.15	**Discussions in break out groups (35 min)** Consideration of theories which could explain elevation-dependent profiles of change in climate variables other than temperature (e.g. precipitation, snow, clouds etc) *All*
10:15 - 10:45	**Coffee break**
10:45 - 11:15	**Presentations and discussion on results of break out groups (15 min)** *All* **Introduction to Unified High Elevation Observing Platforms (UHOPs)[4] (15 min)** *Nick Pepin*
11:15 - 11:50	**Discussions in break out groups (35 min)** Observations and protocols for considered variables *All*
11:50 - 12:30	**Presentations and discussion on results of break out groups (20 min)** *All* **Paper development (10 min)** Timelines, tasks & responsibilities, journals to consider *Nick and Aino* **Final words and next steps (10 min)** *Nick and Aino*
12:30	**Close of Workshop**

[4] http://www.mountainresearchinitiative.org/images/Projects/GEO_GNOME/UHOP-Print-update-April2019.pdf

3. WORKSHOP VENUE

The workshop will take place at 600 Mason Street – walking distance from the Moscone Center.



For any additional questions, please contact Aino Kulonen at aino.kulonen@giub.unibe.ch or Nick Pepin at nicholas.pepin@port.ac.uk.

We look forward to your engaged and active participation!