



**m r i**  
mountain research initiative

The Mountain Research Initiative  
**Key Contact Workshop**  
2014 AGU Fall Meeting



**14 December 2014**  
**First Unitarian Universalist Church**  
**San Francisco, CA**

Report:  
The Mountain Research Initiative

c/o Institute of Geography, University of Bern  
Erlachstrasse 9a, Trakt 3  
3012 Bern  
Switzerland

+41 (0)31 631 51 41  
[mri@giub.unibe.ch](mailto:mri@giub.unibe.ch)  
<http://mri.scnatweb.ch>

Cover photos: Golden Gate Bridge by Chris Brignola (CCO license)

# Table of Contents

Let's talk: Global change research in mountains	4
Workshop location	5
Program and Procedure	6
Instructions to Work Group Leaders	7
<b>Research Summaries</b>	
Bolívar Cáceres	8
Rebecca Cole	10
Nathan Forsythe	12
Francesco Gaetani	14
George Malanson	16
Julie McKnight	18
Giovanny Mosquera	20
Marius Necsoiu	22
Jeeban Panthi	24
Carl Schmitt	26
Scotty Strachan	28
Gregg Treinish	30
Rolf Vinebrooke	32

# Let's talk: Global change research in mountains

## Background

A Key Contact Workshop (KCW) is a 1-day event facilitating and fostering the dialogue between scientists with various backgrounds. The three tools, namely written research summaries, snapshot presentations and small working groups, stimulate interdisciplinary thinking and allow peers to take a fresh look at your research.

The workshop accommodates a maximum of 24 speakers/workgroup chairs, and a few additional participants from a broad range of fields and disciplines from both natural and social sciences. KCWs usually precede major conferences that mountain researchers attend anyway, in this case the 2014 American Geophysical Union Fall Meeting. They offer an additional platform to scientists interested in the dialogue with peers from other disciplines.

## Objectives

The KCW brings together active researchers from around the world working on global change in mountain regions to:

1. present a brief overview of their research programs,
2. comment on fellow participants' research, and
3. discover opportunities for new interdisciplinary research collaborations.

## Fees

No fees apply to workshop participation. Participants are expected to organize their travel and accommodation themselves and to cover their own expenses.

## Procedure

### Participants

- prepare a 1-2 page contribution to the Catalogue of Research Summaries (containing information on their research activities and future plans) prior to the workshop,
- outline current and, especially, future research programs in 5-minute presentations during the KCW
- chair a working group during the event to discuss their research programs in depth (30-40 min), and
- actively participate in other working groups during the KCW.

## Workshop Leader

Dr. Greg Greenwood  
MRI Executive Director  
Email: [greg.greenwood@giub.unibe.ch](mailto:greg.greenwood@giub.unibe.ch)  
Mobile (US): (415) 244-3094  
<http://mri.scnatweb.ch>

## Evaluation

Help us continue to foster meaningful interdisciplinary dialogue about global change in mountain environments by telling us what you thought of this workshop. There are only five short questions; your responses will help us make the next workshop even better! You can access the online evaluation form [here](#).

# Workshop location

## Venue

The Key Contact Workshop will take place in the Murdock Room at the First Unitarian Universalist Church in San Francisco.

The First Unitarian Universalist Church is located close to the intersection of Geary Blvd and Van Ness at 1187 Franklin Street.

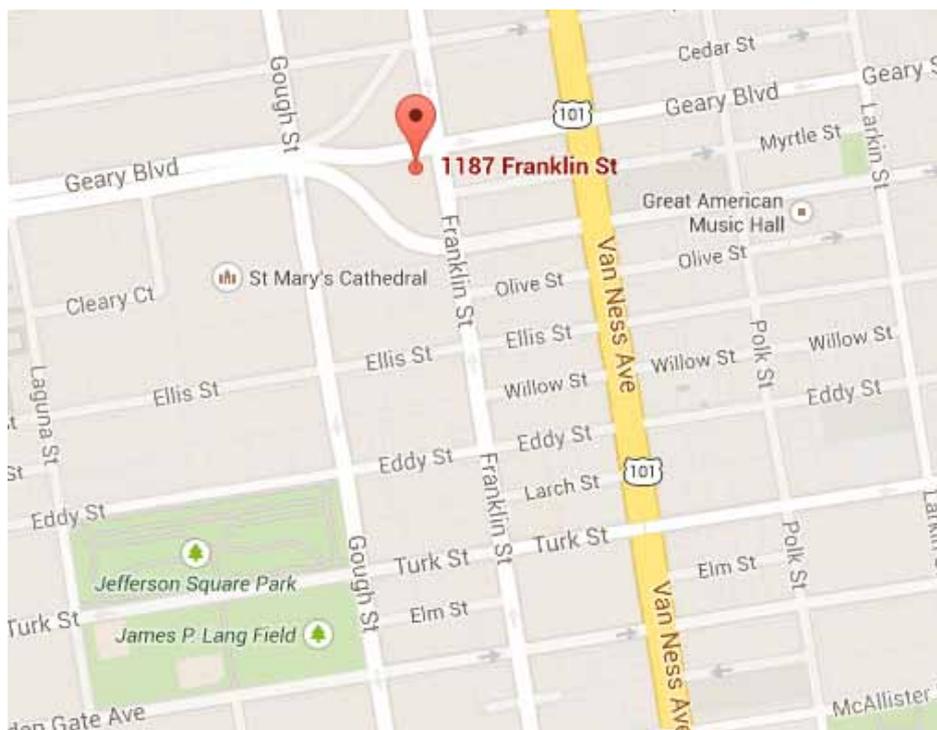
For more information, visit the UUSF [website](#).

## Getting there

MUNI bus numbers 38, 38L, 49, 47 and 90 all stop near the area. Please call 415-673-MUNI (6864) or go to their [website](#) for specific directions from where you are.

### \*Parking\*

Limited time metered street parking is available near the church; two hour residential parking can be found around St. Mary's Cathedral. For nearby parking lots, try Sutter Place Garage (1355-1375 Sutter) or go to [BestParking.com](#).



# Program and Procedure

## Program

Time	Activity
2:00	Arrival
2:15	Welcome and introductions
2:30	Panel 1
3:30	Panel 2
4:30	Panel 3
5:30	Presentation by GEO-GNOME
5:45	Conclusion
6:00	Vacate the premises

## Procedure

Each participant will have 5 minutes to present the highlights of his or her research program using up to 4 slides. No PowerPoint is a fine solution, too; you may use a flip chart if you prefer. Presentations should address current and future research in hopes of triggering questions and input from your colleagues.

You should also include a project idea you would like to develop during the workshop. The presentation can go beyond your own personal research interest, targeting the strategic aims of an entire research group or institution. You are not expected to promote your institution per se, but advocate priority research themes and activities that could benefit from the different perspectives the other participants can bring to it. In general your presentation should be forward-looking, targeted at future projects (vs. past achievements), and brief.

## Suggested panel assignments

	Speakers	Participants
Panel 1	Vinebrooke Treinish Schmitt Panthi	Cole, Strachan Caceres, Forsythe, Gaetano Mosquera, Necsoiu Malanson, McKnight
Panel 2	McKnight Strachan Necsoiu Mosquera	Caceres, Cole Malanson, Treinish, Gaetano Panthi, Schmitt Vinebrooke, Forsythe
Panel 3	Malanson Forsythe Cole Caceres	Strachan, Vinebrooke Mosquera, Panthi, Gaetano McKnight, Treinish Schmitt, Necsoiu

After all four panel members have made their presentation, everyone will gather for about 30 minutes of interdisciplinary thinking. Presenters will turn into work group leaders who will lead the discussion of their research ideas or of topical questions. All participants should stay with their assigned group for the first five or ten minutes, but thereafter participants are free to move about. The cycle then repeats.

MRI has run Key Contact Workshops in Europe and the US. The MRI Events webpage <http://mri.scnatweb.ch/events> provides more information on these workshops, along with research summaries. This workshop will be similarly organized, taking stock of suggestions from recent workshop evaluations.

# Instructions to Work Group Leaders

## Role of the Chair

- Introduce your specific topic for discussion.
- Facilitate a focused discussion that meets your needs.

## Role of the Rapporteur

- The Chair can select a Rapporteur if he/she desires.
- Support the chair by taking notes, writing down/drawing ideas on the flip chart.
- Watch the time and notify the groups when five minutes remain to allow a wrap-up.

## Materials

- Flip charts or table with flip chart paper
- White cards 1/3 of A4 (ca. 20 x 10cm)
- Markers, different colors

## Technical Framework

Working groups sit around a table with paper or a flip chart.

1. The chair briefly introduces the topic that he/she wishes to discuss.
2. The rapporteur, if designated, writes the names of the working group members and a short heading on the flip chart and uses it as a mind map for documenting the discussion and ideas (unfiltered!).
3. The Chair can present any topic but as a default, the following three questions can be used:
  - How could the presented research be improved? (free brainstorming, focus on “what?”)
  - Which other discipline/approach/methodology would shed new light on the proposed research? (focus on “how?”)
  - Which individuals/research groups/project consortia have worked or are working in a related field and should be consulted? (focus on “who?”)

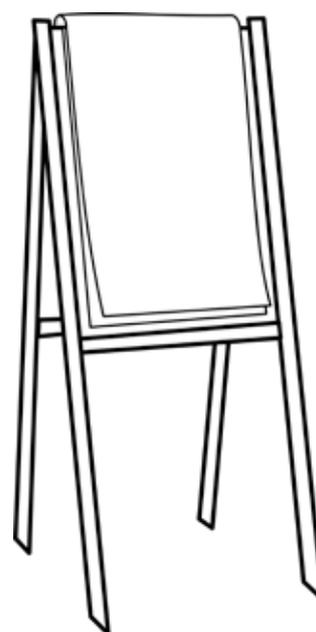
4. The Chair wraps up the discussion identifying the most important elements/insights that could improve his/her research project.

## Please note

- Every idea counts!
- Silent work can be productive, too.
- Giving a few minutes to think and take notes can be a good stimulant and achieve high participation!

## If you work with cards

- One idea per card
- Max. three lines per card
- No CAPITAL letters



# Bolívar Cáceres

## Instituto Nacional de Meteorología e Hidrología Quito, Ecuador



ernestocaceres2002@yahoo.com.mx

www.serviciometeorologico.gob.ec

### Keywords

glaciers, global warming

### *What are your central research objectives?*

Document the evolution of Ecuadorian glaciers during the last forty years in relation to climate change

*On what phenomena do you take data, and what are you attempting to predict or characterize using those data?*

My research focuses on : Glaciers cover evolution , location of equilibrium line altitude (ELA), determination of acumulation ratio (AAR), some measurements at high altitude for Ecuadorian glaciers. The data will relate the evolution of glaciers in relation to climate change.

*What is the geographic scope of your research and where do you gather data?*

Regional. I gather data in Ecuador.

*What agencies or foundations fund your research, what are the times horizons for your funding?*

At present the research is funded by Instituto Nacional de Meteorología e Hidrología (INAMHI). We will develop this study for the next five years. *What institutions, organizations or other entities*

*are your main collaborators? What do they bring to your research?*

World Glacier Monitoring Service (WGMS), they provide technical support for this purpose

*How would you like to see your research program evolve over the next 5-10 years?*

I would like to updated the glacier coverage in Ecuador using photos or images taken during this time (5-10 years) and probably determine the main cause of this phenomenon.

*What skills, disciplines, methods or other forms of expertise you would like to incorporate into your research in the future?*

I would like to incorporate remote sensings so in this way we could compare our results using photogrametry and field work.

*What other challenges are you thinking about, and how might you tackle them?*

I would like to establish cooperation to develop a network for measurement of the temperature in high altitudes (3000-4800 masl) in order to identify relations with Elevation dependant Warming (EDW).





# Rebecca Cole

## University of Hawaii at Manoa

### Honolulu, HI USA



colerj@hawaii.edu

www.rebeccajcole.com

#### Keywords

Restoration ecology, ecological processes, global change

#### *What are your central research objectives?*

I am a tropical ecologist interested in understanding how human-driven disturbances affect ecosystem structure and function. My mountain research in the Peruvian Andes focuses on assessing how grassland and forest ecosystems respond to reduced grazing pressure and how these responses vary across temperature gradients. The overall objectives are to inform land management practices and climate change adaptation.

#### *On what phenomena do you take data, and what are you attempting to predict or characterize using those data?*

Along with collaborators with the American Climber Science Program (<https://climberscience.wordpress.com/>), I have established a set of 12 small cattle grazing exclosures (12×12m each) across an elevation gradient from 4000 to 4800m in a valley in the Cordillera Blanca, Peru. Larger-scale assessments that we have carried out over the previous two years show that large area of grassland and forest in the Cordillera Blanca have become extremely degraded through overgrazing, burning, and extraction of plants. I am currently measuring vegetation and soil responses

inside and outside of the exclosures.

#### *What is the geographic scope of your research and where do you gather data?*

Part of my research is in Huascarán National Park, Peru where I am assessing the impacts of grazing on ecosystem structure and function. Specifically, I am working the Ulta, Ishinca, and Llanganuco valleys all of which are extremely important watersheds for large human populations in the district of Ancash, Peru. These areas are also critically important for conservation of native plants and animals and are managed for multiple uses including grazing, tourism, watershed protection and conservation. Data is collected in the primary vegetation types (Puna grassland and Polylepis forests) from 3500m to 5000m elevation. I am also surveying soil and litter arthropods in threatened Polylepis forests and the grasslands that have replaced them in the Cordillera Blanca. Along with students, I am also testing how species richness and temperature affect rates of litter decomposition across an altitudinal gradient in the same area.

Other aspects of my research are in highly endangered dry and wet montane forests on the Hawaiian Islands. Along with colleagues, I am testing how removal of nonnative ungulates affects the spread of invasive plants, the recovery of native plants, and nutrient cycling. We are testing whether manipulation of soil nutrients can be used to alter competitive dynamics between native and nonnative plants across several different ecosystem types.

I have also worked over the past decade in montane and lowland wet tropical forests in Costa Rica testing a variety of large-scale forest restoration approaches and assessing recovery of key ecosystem functions during forest succession.

#### *What agencies or foundations fund your research, what are the times horizons for your funding?*

My Peru work is partly funded with help from the American Climber Science Program volunteers and partly funded through a grant from USAID. My Costa Rica research is funded through the National Science Foundation and the Hawaii work is funded through the US Department of Defense.

I do not have funding for continued monitoring in the cattle grazing exclosures in Peru in 2015. I plan to carry out baseline measurements on a self-funded basis through the American Climber Science Program if other funding is not available.

*What institutions, organizations or other entities are your main collaborators? What do they bring to your research?*

Research collaborations on my Peru work include researchers and students from Western Kentucky University, Western Washington University, Universidad Nacional Santiago Atunéz Mayolo, Peru and Universidad Nacional Agraria La Molina Peru. Dr. John All (Western Kentucky University) is leading associated research using remote sensing to measure differences and changes in vegetation cover and fire impacts across the Cordillera Blanca over time. Students at Western Washington University are assisting with a survey of soil and litter arthropods in endangered *Polylepis* forests and surround grasslands in four different valleys. Students at the Peruvian universities are helping to measure vegetation and soil responses in the cattle exclosures and are helping with a litter decomposition experiment.

*How would you like to see your research program evolve over the next 5-10 years?*

This is really a long-term project. I hope to use this initial set of cattle grazing exclosures in the Cordil-

lera Blanca as baseline data and 'proof of concept' for a proposal to assess the vegetation and biogeochemical responses across a multiple ecosystem types and test potential climate change impacts on critical ecosystem services such as sustainable grazing, water supply, forest products, and maintenance of native biodiversity.

*What skills, disciplines, methods or other forms of expertise you would like to incorporate into your research in the future?*

I currently have three Peruvian students working on this project and want to continue to fund local students to carry out their graduate work. There are opportunities for associated research in biogeochemistry, plant ecophysiology, and entomology (to name a few) associated with my current project.

*What other challenges are you thinking about, and how might you tackle them?*

Down the line it would be valuable to carry out a precipitation manipulation study on the west side of the Andes to assess how alteration of precipitation timing and quantity will affect grassland structure and function.



# Nathan Forsythe

## Newcastle University

### Newcastle upon Tyne, United Kingdom



nathan.forsythe@ncl.ac.uk  
website=n/a

#### Keywords

meteorological reanalysis; remote sensing; climate models; downscaling; hydrological modelling; participatory management; adaptation

#### *What are your central research objectives?*

1. Improving the spatio-temporal characterization of present Hindu Kush-Karakoram-Western Himalaya (HKH) hydroclimatology through novel synergies in multiple independent data sources;
2. Assessing patterns of change in the available HKH historical record and investigating likely causal mechanisms of these changes;
3. Developing plausible scenarios of future climate change in the HKH;
4. Improving coupled cryosphere-hydrological modelling of key river catchments in the HKH;
5. Investigating viable adaptation pathways for local communities to cope with on-going hydroclimatological change in the HKH.

*On what phenomena do you take data, and what are you attempting to predict or characterize using those data?*

precipitation, near surface air temperature, land surface temperature, snow cover, cloud cover,

NDVI, river flows (runoff)  
present and future variability of available resources for human systems of water supply and food security (agricultural production).

*What is the geographic scope of your research and where do you gather data?*

I work primarily in the Upper Indus Basin (Hindu Kush-Karakoram-Western Himalaya), although I have developed proposals to extend work eastward along Himalayan arc. We are users of local observational data supplied by national technical agencies as well as gridded datasets (remote sensing, meteorological reanalyses and climate models) produced by leading international institutions (NASA, ECMWF, MetOffice Hadley Centre, etc).

*What agencies or foundations fund your research, what are the times horizons for your funding?*

Currently, the Leverhulme Trust funds my work through spring 2016. Grant proposals to multiple other funding agencies are pending.

*What institutions, organizations or other entities are your main collaborators? What do they bring to your research?*

Northumbria University (UK), UK MetOffice Hadley Centre, Global Change Impact Studies Centre (Pakistan), Hamburg Universität (Germany), Kumaun University (India)

*How would you like to see your research program evolve over the next 5-10 years?*

Geographical expansion as indicated above along with reinforcement in terms of research resources applied to the individual objectives listed above.

*What skills, disciplines, methods or other forms of expertise you would like to incorporate into your research in the future?*

Our initiative to incorporate community monitoring (see above) into stakeholder engagement regarding potential adaptation pathways includes potential contributions from specialists in gover-

nance/institutional analysis and gender and generational equity in resource access and management.

*What other challenges are you thinking about, and how might you tackle them?*

“water-food-energy-ecosystem nexus” and “upstream-downstream conflicts” are “big picture” challenges which we would like to evolve our research to address.



# Francesco Gaetani

## Group on Earth Observations

### Intergovernmental Organization, Geneva, CH



[fgaetani@geosec.org](mailto:fgaetani@geosec.org)  
[www.earthobservations.org](http://www.earthobservations.org)

#### Keywords

data sharing, data management, Earth observations

#### *What are your central research objectives?*

GEO-GNOME, The Global Network for Observations and Information in Mountain Environments (GNOME) of the international Group on Earth Observations (GEO) will capitalize on previous achieved results and outcomes (such as GLORIA and other global and regional initiatives), with the goal to provide free and open-access to data and products, scientific results and future climate and environmental projections; foster exchange of data and information across different mountain areas and between the scientific community and stakeholders and better connect them; build capacity in mountain research, especially in remote areas; and create a distribution system for the dissemination of this knowledge, in particular to the local communities and decision makers to enable for change.

*On what phenomena do you take data, and what are you attempting to predict or characterize using those data?*

- a. Elevation Dependent Warming;
- b. Role of mountains in providing water to low-land areas
- c. Effects of climate change on mountain lakes

d. Effects of extreme events (droughts, erosion, floods) on mountain ecosystems and their recovery time (if any).

*What is the geographic scope of your research and where do you gather data?*

In GEO-GNOME particular importance is given to the definition of national or trans-boundary Supersites and regional Natural Laboratories, such as the area of Karakoram and specific regions in South America, Africa and elsewhere, including internationally relevant protected areas. These natural laboratories can serve as pilot areas for monitoring and measuring ongoing changes, develop future scenarios with special emphasis on ecosystem services, and implement adaptation strategies through discussion with local populations and governments, taking into account also the needs of downstream populations.

*What agencies or foundations fund your research, what are the times horizons for your funding?*

No specific funding mechanism in place

*What institutions, organizations or other entities are your main collaborators? What do they bring to your research?*

- ISAC-CNR, Italy
- Ev-K2-CNR Committee, Italy
- European Academy of Bozen/Bolzano EURAC, Italy
- Instituto Antartico Chileno INACH, Chile
- Universidad de Magallanes, Chile
- Ministerio de Relaciones Exteriores, Ecuador
- Nepal Academy of Science and Technology, Nepal
- Ev-K2-CNR Committee, Pakistan
- CONDESAN, Peru
- Univ. of California, Santa Barbara, USA
- ICIMOD
- UNOOSA
- UNEP /GRID – Arendal
- Mountain Partnership Secretariat - FAO
- Regional Center for Mapping of Resources for Development. RCMRD
- University of Bern, Switzerland
- Universitat de Barcelona, Catalunya, Spain

*What other challenges are you thinking about, and how might you tackle them?*

5. Create a comprehensive partnership of key stakeholders and network of existing measurement and observation systems in the mountain areas, collecting the data and information; and making them available through the GEOSS portals. A first workshop on these aspects will be held in summer 2014.
6. Stimulate new measurements and observational campaigns in mountain areas, with special emphasis on sensitive areas and UNESCO designated Biosphere Reserves, Natural Heritage Sites and internationally relevant protected areas, stimulating the design of new/better management of existing protected areas and the establishment of new parks.
7. Provide the Earth observations necessary to support implementation and monitoring of international conventions and agreements, such as the Convention on Biodiversity (CBD), the United Nations Framework the Convention on Climate Change (UNFCCC) as well as regional mountain arrangements and agreements such as the Alpine and Carpathian Conventions.
8. Make best use of Earth observations and remote sensing data, which can display critical aspects of mountain areas with complex topography and high elevations.
9. Develop capacity-building strategies and concrete activities in mountain monitoring and sustainable development, through the provision of on-site courses and training exercises with a particular focus on developing countries with fragile mountainous ecosystem.
10. Identify potential Supersites and Natural Laboratories, with the related Points of Contact and/or Regional Champions, and start operational activities in the selected areas.
11. Create highly visible and valuable outputs (e.g. reports with summaries specifically dedicated to groups interested in mountain environments) to stimulate interaction between researchers, stakeholders and in particular policy makers to identify the key environmental and associated issues in each mountain area and trigger relevant needed action on the various levels (global, regional etc).

# George Malanson

University of Iowa, Iowa City, Iowa USA and  
National Science Foundation, Arlington, VA, USA



[george-malanson@uiowa.edu](mailto:george-malanson@uiowa.edu)  
[gmalanso@nsf.gov](mailto:gmalanso@nsf.gov)

<http://clas.uiowa.edu/geography/people/george-malanson>

## Keywords

alpine, climate change, plant community, treeline

*What are your central research objectives?*

To determine the relations of spatial pattern and processes by which plant communities are organized and respond to climate change

*On what phenomena do you take data, and what are you attempting to predict or characterize using those data?*

Alpine tundra and alpine treeline; changes in species composition, spatial pattern, and changes in both.

*What is the geographic scope of your research and where do you gather data?*

Western USA, primarily in the Rocky Mountains

*What agencies or foundations fund your research, what are the times horizons for your funding?*

USGS and NSF, on 5 and 3 year horizons

*What institutions, organizations or other entities are your main collaborators? What do they bring to your research?*

USGS, with Dan Fagre and his part of the GLORIA project. Bringing field expertise in botany, access to data, and expertise in climate change research.

*How would you like to see your research program evolve over the next 5-10 years?*

I expect to wrap up a general statement on mountain landscapes.

*What skills, disciplines, methods or other forms of expertise you would like to incorporate into your research in the future?*

None – too close to retirement, but I would expect to see more genomic sequencing to determine plant species composition and diversity in alpine tundra, where old taxonomy may be problematic.

*What other challenges are you thinking about, and how might you tackle them?*

Are there patterns and processes in alpine tundra or treeline that could illuminate ecological thinking more generally?



# Julie McKnight

## University of Tennessee

### Knoxville, TN, U.S.A.



Jmcknig8@vols.utk.edu  
<http://geography.utk.edu>

#### Keywords

Water Processes; Biogeochemical Cycles; Soil Carbon Processes; Soil-Water Coupled Processes; High Altitude Grasslands; Land-Use Change; Climate Change

#### *What are your central research objectives?*

To investigate the relationship between geomorphologic, hydrologic, and biogeochemical processes. Specifically I am interested in the effects of land use change and climate change on soil-water coupled processes and the implications of these effects on terrestrial biogeochemical fluxes. Although I conduct research across multiple spatial scales, I am most interested in employing a watershed-scale approach.

#### *On what phenomena do you take data, and what are you attempting to predict or characterize using those data?*

Presently, my research focuses on the effects of land-use history on soil carbon processes. My data include, but are not limited to: soil carbon content (total and organic), water extractable (labile) carbon content, soil carbon dioxide flux, soil moisture, soil temperature, other soil physical properties, vegetative community (or land cover description), and soil microbial activity (for N, P, and different fractions of soil carbon). These data can be used to predict/interpret the implications of land management decisions with respect to

local to regional to landscape scale carbon budgets and may have implications for assessing trade-offs with other ecosystem services (such as water yield and soil quality).

#### *What is the geographic scope of your research and where do you gather data?*

Currently, I have two primary field sites: 1) High altitude grasslands (of varying land use history) in the southern Ecuadorian Andes and 2) Two constructed agricultural wetlands located in the Appalachian foothills in east Tennessee.

#### *What agencies or foundations fund your research, what are the times horizons for your funding?*

I am currently supported by a Teaching Assistantship at the Univ. of Tennessee and I plan to graduate in May 2015.

Contributions to research include: 1) UTK McClure Scholarship (Grant used to support field work in Ecuador in December 2013 - expired); 2) UTK Institute for a Secure and Sustainable Environment Supplies Grant (Ended 2012); 3) The Wetland Foundation (Travel grant to support field work at East Tennessee wetland field sites – Expires November 2014. My research is featured at the following site: [http://thewetlandfoundation.org/The\\_Wetland\\_Foundation/2014\\_Awardees/2014\\_Awardees.html](http://thewetlandfoundation.org/The_Wetland_Foundation/2014_Awardees/2014_Awardees.html) ).

#### *What institutions, organizations or other entities are your main collaborators? What do they bring to your research?*

UTK Institute of Agriculture: Collaborations with faculty members in the UTK Institute of Agriculture have provided access to laboratory facilities (specifically a wet soil biogeochemistry lab) and information specific to the construction and design of two constructed agricultural wetlands.

UTK Little River Environmental Unit: This is an off-campus research institute affiliated with the University of Tennessee, Knoxville that is also an operational dairy farm. The two constructed wetlands featured in my dissertation research are located at this site, with access gained through communi-

cation and collaboration with the Little River Unit staff.

Fundación Cordillera Tropical: This is a non-profit organization based in Cuenca, Ecuador that oversees research and land management on the Mazar Wildlife Reserve located in the Azuay province of southern Ecuador. My dissertation research located in the Andes was made possible through collaboration with the FCT staff. More information on this organization can be found here: [www.cordilleratropical.org/en/activities/research/research.html](http://www.cordilleratropical.org/en/activities/research/research.html) (my research is featured on this webpage)

*How would you like to see your research program evolve over the next 5-10 years?*

Upon completion of my Ph.D. in the Spring of 2015, I intend to pursue a position as a postdoctoral researcher. Although my ultimate goal is to attain a tenure-track faculty position at a University, I would like to focus on research for 1-3 years in a postdoctoral position. This will allow me to continue to build upon the foundation I have created for research in the Ecuadorian Andes and to hopefully expand the geographic focus of my research to other high altitude systems. Specifically, I am interested in the high altitude grasslands of New Zealand as they are among the most similar ecosystems to the páramos of the South American Andes and am very open to systems I have yet to consider. In addition to expanding the geographic focus of my research, I also hope to broaden my skill set to include the analysis of other soil/water nutrient cycles (including nitrogen and phosphorous) and include a climate change research component (i.e. effects of wetting/drying and warming on hydrologic and soil biogeochemical processes).

Following a postdoctoral position, I will actively seek a tenure-track faculty position within the next 2-5 years, ideally in a program where I can continue to focus on high altitude (and potentially high latitude) ecosystem research but also incorporate teaching at a University level.

*What skills, disciplines, methods or other forms of expertise you would like to incorporate into your research in the future?*

- Analysis of nitrogen and phosphorous in conjunction with carbon (both soil and water analysis).
- Inclusion of more water-chemistry research to link to upland and riparian soil biogeochemical processes.
- Collaboration with hydrologists to relate my research to hydrologic flow and geomorphology, especially where these processes are effected (or anticipated to be effected) by climate change or anthropogenic activity.
- Collaboration with plant and other biologists.

*What other challenges are you thinking about, and how might you tackle them?*

Although I have experience employing various methods to analyze components of carbon processes, I anticipate the need for some training and collaboration to be as competent in analyzing and interpreting nitrogen and phosphorous data (although I am certainly familiar with the basics). Further, expanding the geographic focus of one's research is never easy and often requires time, money, and collaboration. I hope that by engaging with groups, such as the Mountain Research Institute, I will have the opportunity to engage with potential collaborators and gain more exposure to research and/or job opportunities through which I can expand my experience and, hopefully, my horizons (literally!).



# Giovanny Mosquera

## University of Cuenca

### Cuenca, Ecuador



[giovamosquera@gmail.com](mailto:giovamosquera@gmail.com)  
[mosquerg@onid.orst.edu](mailto:mosquerg@onid.orst.edu)  
(Website under construction)

#### Keywords

Andean ecosystems, hydrological processes, eco-hydrology, land use, climate change and variability, geochemical tracers

#### *What are your central research objectives?*

Determining the ecohydrological functioning of high-elevation ecosystems in the Andean mountain range.

Understanding spatio-temporal patterns of hydrometeorological variables (e.g., precipitation, evapotranspiration) to infer future susceptibility

*On what phenomena do you take data, and what are you attempting to predict or characterize using those data?*

We use hydrogeochemical data (stable isotopes, nutrients, and metals) to investigate age, origin and flow paths of water; and understand impacts of land use change in the study area.

We record hydrometeorological data (stream-flows, precipitation, evapotranspiration fluxes, soil water tension and moisture) to understand the current functioning of the landscape, and predict climate change and variability impacts on the water resources in our area of study.

We also collect data on biophysical features of the landscape to investigate landscape controls on hydrometeorological variables.

*What is the geographic scope of your research and where do you gather data?*

Our geographic scope includes high-elevation ecosystems mainly located in Southern Ecuador within the Andean mountain range. We currently monitor the Zhuruca River experimental basin (7.53 km<sup>2</sup>), a tropical alpine ecosystem, locally known as páramo within an altitudinal range of 3200 to 3900 m a.s.l. We have a nested monitoring network conformed of 7 small catchments (0.25 to 7.53 km<sup>2</sup>).

Starting in early 2014 we started to collect data in the Quinuas River basin, a meso-scale nested páramo basin (40-300 km<sup>2</sup>) extending from 2500 to 4400 m a.s.l.

In addition, we also have access to data from the San Francisco Scientific Station, a tropical montane cloud forest ecosystem.

*What agencies or foundations fund your research, what are the times horizons for your funding?*

- The Ecuadorian National Secretary of Higher Education, Science and Technology (SENESCYT).
- The Central Research Office of the University of Cuenca, Ecuador (DIUC)
- The German Research Foundation (DFG).
- The city of Cuenca's Drinking and Sewage Water Treatment Company (ETAPA EP).
- The Ecuadorian Electricity Corporation (CELEC EP).

*What institutions, organizations or other entities are your main collaborators? What do they bring to your research?*

ETAPA EP and several universities worldwide including University of Giessen and Dresden University of Technology (Germany), University of Leuven (Belgium), Texas A&M University and Oregon State University (United States).

*How would you like to see your research program evolve over the next 5-10 years?*

Our main goal is to become a leading research unit to investigate ecohydrological processes in high-elevation ecosystems, and to provide stakeholders and decision makers with valuable information to derive policies of adaptation to the impacts of land use, and climate change and variability in the water resources in these ecosystems.

Additionally, we expect to improve our understanding at local scale, while contributing towards to global advances in our fields of study.

For this our research program will have to include more disciplines, including the social sciences (still absent in our current program), as to tackle the real challenges of sustainable mountain development.

*What skills, disciplines, methods or other forms of expertise you would like to incorporate into your research in the future?*

SVATs models, ecological modeling, crop growth modeling, and the coupling of models at different scales; Social sciences.



# Marius Necsoiu

## Southwest Research Institute

### San Antonio, TX, USA



[mnecsoiu@swri.org](mailto:mnecsoiu@swri.org)  
<http://geomatics.swri.org>

#### **Keywords**

sub-pixel precision, displacement measurements, InSAR, mountain permafrost, rock glaciers, PS, SBAS, Carpathian mountains, glacier dynamics

#### *What are your central research objectives?*

To quantify rock glacier dynamics using state-of-the-art techniques based on complementary high resolution optical and radar satellite imagery.

*On what phenomena do you take data, and what are you attempting to predict or characterize using those data?*

Our focus is rock glacier surface kinematics, as a trigger for geomorphic processes. Kinematics is a key element in properly understanding the complexity of alpine debris transportation systems and their role.

*What is the geographic scope of your research and where do you gather data?*

This research focuses on several rock glaciers located in Retezat National Park, Southern Carpathian Mountains, Romania. Radar satellite data is provided by the German Aerospace Center (DLR), Japanese Space Agency (JAXA). Optical satellite data is provided by DigitalGlobe and Airbus Defense and Space.

*What agencies or foundations fund your research, what are the times horizons for your funding?*

U.S. National Science Foundation

*What institutions, organizations or other entities are your main collaborators? What do they bring to your research?*

West University of Timisoara (WUT), Romania, being one of the top higher-education schools in the country. WUT provides access to their field database on permafrost records for Retezat (climatic, geological, geophysical and topographic data). In addition WUT organized the 2014 field campaign for collection of geophysics measurements and GPS data.

*How would you like to see your research program evolve over the next 5-10 years?*

We hope that this research will advance and broaden our understanding of climate trends and permafrost evolution in mountainous areas and will strengthen the potential to utilize remote sensing techniques to detect and monitor a variety of rock glacier movements. We hope that the results of this preliminary work creates a baseline for future studies on rock glacier movements in Central and Eastern Europe alpine regions [e.g., Carpathians (Czech Republic, Poland and Slovakia), Tatra (Poland and Slovakia), Rila (Bulgaria), Durmitor (Montenegro), Prokletije (Albania)], where information on glacier rock dynamics is scarce or completely missing. In parallel with this work, we are initiating similar research activities in the United States.

*What skills, disciplines, methods or other forms of expertise you would like to incorporate into your research in the future?*

This research promotes interdisciplinary research, bringing together principles and specific methods encompassing geomorphology, climatology, mountain ecology, remote sensing, and geoinformatics. Geomorphology and remote sensing aspects are the focus of this current research, other expertise being needed in the near future.

*What other challenges are you thinking about, and how might you tackle them?*

Challenges are mainly related to the availability of ground data required to validate satellite measurements. In case of using historical data this task may be never possible. However limited validation may still be possible in the future by field campaigns synchronized with new satellite data acquisitions.



# Jeeban Panthi

Tribhuvan University, The Small Earth Nepal (SEN)  
Kathmandu, Nepal



[jeeban@smallearth.org.np](mailto:jeeban@smallearth.org.np)  
[www.smallearth.org.np](http://www.smallearth.org.np)

## Keywords

Climate, water, mountain, vulnerability

*What are your central research objectives?*

Assessing the hydrological responses to climate change in Himalayan region.

*On what phenomena do you take data, and what are you attempting to predict or characterize using those data?*

Existing weather and hydrological stations and establishing few hydro-meteorological instruments in a case study river basin in Nepal Himalaya.

*What is the geographic scope of your research and where do you gather data?*

Nepal Himalaya (in particular: Karnali river basin in western Nepal).

*What agencies or foundations fund your research, what are the times horizons for your funding?*

Asia Pacific Network for Global Change Research (APN), 2013-2015

*What institutions, organizations or other entities are your main collaborators? What do they bring to your research?*

Department of Hydrology and Meteorology (DHM), Government of Nepal. DHM gives me its observation data (weather and hydrology).

*How would you like to see your research program evolve over the next 5-10 years?*

Similar types of researches in small watershed level so that we can cover the entire Nepal. Synthesizing the information and developing a quality policy brief helps for decision support system.

*What skills, disciplines, methods or other forms of expertise you would like to incorporate into your research in the future?*

Analyzing climate model data, hydrological modeling and model calibration.

*What other challenges are you thinking about, and how might you tackle them?*

No data in high altitude region, we need to use remote sensing products for example TRMM for precipitation.



# Carl Schmitt

## National Center for Atmospheric Research

### Boulder, Colorado, USA



schmittc@ucar.edu  
www.carlgschmitt.com

#### Keywords

Black carbon, glacier albedo, water supply

#### *What are your central research objectives?*

My mountain research focuses on the detection of black carbon on the snow of glaciers in South America. Black carbon is important as increased levels of black carbon significantly increases glacier melt rates thus putting an additional burden on water supply. I have been conducting research expeditions as part of the American Climber Science Program in the Cordillera Blanca mountains of Peru. What I have found is that contrary to Northern Hemisphere locations, the bulk of the black carbon comes from local sources. There is no "China" to produce black carbon which contaminates snow in North America. Given this, mitigation efforts have a much higher likelihood of being successful as the sources and glaciers are in the same countries.

#### *On what phenomena do you take data, and what are you attempting to predict or characterize using those data?*

My research focuses on quantifying the existence and amount of black carbon on glaciers. Through collaborations with scientists doing glacier mass balance measurements I would like to quantify how much additional melting is being caused by black carbon. This will help local planners to better understand the timeframe necessary to

make infrastructure changes which will be necessary to ensure water security in the long run.

#### *What is the geographic scope of your research and where do you gather data?*

Most of my research is focused on the tropical Andes (Peru and Bolivia). Since the techniques that I have developed for this research are about 10% of the cost of traditional techniques, I am working with people in Nepal, Chile, Greenland, and Wyoming as well. Most of my samples have been collected by American Climber Science Program volunteers while climbing high mountains in South America. I lead the research in Peru and Bolivia and I provide support in terms of equipment and basic analysis for other projects. With modest funding I would be able to support and or lead projects to measure black carbon in more regions.

#### *What agencies or foundations fund your research, what are the times horizons for your funding?*

For the most part my research is self funded. We have received small NSF (epscor) funding as well as the Molina Center for Energy and the Environment has donated funds for this research as part of the PISAC Initiative ([www.mce2.org/activities/pisac](http://www.mce2.org/activities/pisac)). The American Climber Science Program has received private donations from individuals to support expeditions, but this has never been enough to do more than to modestly reduce costs of expeditions and there have never been salary funds for any projects yet. A lot of our research funds have gone towards supporting students, Peruvian and US. I hope to submit several proposals for this research in the next year. I plan to target NSF as well as a few foundations for funding. I am also happy to add my research to other large-scale projects.

#### *What institutions, organizations or other entities are your main collaborators? What do they bring to your research?*

NOAA is helping with data analysis. University of Nevada, Reno is helping with instrument development. Research collaborators from Western Kentucky University, Western Washington University,

University of Hawaii, Manoa. Student assistants from UNASAM, Huaraz, Peru, UNSAAC, Cusco, Peru. University collaborators throughout South America.

*How would you like to see your research program evolve over the next 5-10 years?*

My research is developing and attracting a lot of attention in the South American scientific community. I would like to develop collaborations to include water supply (hydrology), water quality, air pollution, and societal impacts. I am on my fourth year of conducting this research on a volunteer basis on my vacation time. I would like my research program to involve funding in the future.

*What skills, disciplines, methods or other forms of expertise you would like to incorporate into your research in the future?*

I have developed collaborations in air pollution and water quality. I will be actively searching for collaborators interested in the hydrology and societal impacts in South American systems being affected by glacier loss.

*What other challenges are you thinking about, and how might you tackle them?*

Larger research collaborations looking at all of the aspects of a system seem to be more likely to be funded these days. I hope that this workshop could open some doors for developing a good research team.



# Scotty Strachan

## University of Nevada, Reno

### Reno, Nevada USA



scotty@dayhike.net

[www.unr.edu/geography/people/scotty-strachan](http://www.unr.edu/geography/people/scotty-strachan)

#### Keywords

mountain climate, dendrochronology, instrumental monitoring

#### *What are your central research objectives?*

- Improvement of modern in-situ environmental monitoring extent, methods, and quality
- Relation of critical water-supply-related climatic variables esp. snow/precipitation dynamics to vegetation/tree growth
- Improved reconstruction of past climatic variables using tree rings
- Measurement and evaluation of seasonal snow accumulation
- Improve management of science data, esp. field-collected data

#### *On what phenomena do you take data, and what are you attempting to predict or characterize using those data?*

Near-surface meteorological processes: in-situ conditions related to weather events and longer-term climatic trends

Tree ring characteristics: past ecological history as recorded in tree growth, tied to stand-level forces such as weather and climate

In-situ imagery: record daily events and seasonal conditions in remote study locations

#### *What is the geographic scope of your research and where do you gather data?*

Intermountain west of the United States, esp. the Great Basin province.

#### *What agencies or foundations fund your research, what are the times horizons for your funding?*

National Science Foundation – 2016  
University of Nevada, Reno – 2016

#### *What institutions, organizations or other entities are your main collaborators? What do they bring to your research?*

- United States Forest Service – direct scientist collaboration
- Long Now Foundation – study area and idea collaboration
- Desert Research Institute – direct scientist collaboration
- Nevada EPSCoR office – NSF-EPSCoR project funding
- UNR Cyberinfrastructure Lab – data management collaboration
- Federation of Earth Science Information Partners (ESIP), Envirosensing Cluster – collaboration on best practices for environmental sensing and data management

#### *How would you like to see your research program evolve over the next 5-10 years?*

Since I am early-career, I am interested in expanding the geographic scope of my research as well as collaborative scope. Certain science projects will remain ongoing in my current region of expertise, however I am reviewing possibilities of doing research in other mountainous and/or semi-arid regions of the world.

#### *What skills, disciplines, methods or other forms of expertise you would like to incorporate into your research in the future?*

I see data management as a huge problem for current scientists at the small-to-medium project scale, and I would like to incorporate better methods of field-to-analysis management.

I would like to incorporate experimental sensing techniques related to precipitation and snow.  
I would like to leverage new technologies to provide wireless sensor connectivity on the km scale to central stations.

*What other challenges are you thinking about, and how might you tackle them?*

Other challenges include planning and sustainability of larger-scale monitoring networks which are primarily technology-based. For instance: identifying the people/organization to set up and manage these networks in a funded, 50-year planning model. How to approach this is a good question.



# Gregg Treinish

## Adventurers and Scientists for Conservation (ASC)

### Bozeman, Montana, USA



gregg@adventureandscience.org  
www.adventureandscience.org

#### Keywords

*What are your central research objectives?*

ASC mobilizes the outdoor community to collect hard-to-attain scientific data for conservation initiatives supporting the work of partner scientists, organizations and agencies. Harnessing the skills of volunteer outdoor athletes, ASC is capable of collecting data on a massive scale.

*On what phenomena do you take data?*

Currently, ASC volunteers are collecting data on five major initiatives: pika habitat, marine microplastics, high altitude glacial thinning, roadkill, and wildlife on the American Prairie Reserve. Our research partners include scientists, agencies, universities, businesses, nonprofits and private landowners. We draw from a global network of volunteers, efficiently and effectively collecting data on a scale that would otherwise be logistically challenging. The key: choosing projects where adventure scientists can have the greatest impact.

*What are you attempting to predict or characterize using those data?*

We work to solve the most pressing conservation challenges of our time. While supporting researchers and agencies, we are simultaneously building a community of informed advocates who are making a hands-on contribution to science. Together with the outdoor industry, we leverage

these stories to influence conservation.

*What is the geographic scope of your research?*

ASC utilizes two project models:

1. **Adventurers at Large:** ASC mobilizes outdoor enthusiasts to collect data/samples during independent expeditions; incoming data contributes to ongoing national and international research.
2. **Partnership Projects:** Government agencies and private groups contract ASC to recruit, train and manage teams of volunteer adventure scientists to gather environmental data/samples from remote locations.

*Where do you gather data?*

Currently, marine adventurers are collecting water samples from every ocean to support microplastic pollution research. Volunteers with our Landmark project are living and collecting data on the American Prairie Reserve in northeastern Montana as part of a multi-year partnership to inform reserve management. Other ASC athletes are collecting snow and ice samples from above 20,000 feet in the Himalaya for research on high-altitude glacial melt and recording pika sightings in alpine regions worldwide to collect baseline information for a study on changes in habitat due to climate change. Cyclists, runners and other athletes on roadways record roadkill data to inform research on how roadways and wildlife interact.

*Over what geographic domain do your conclusions hold?*

By tapping into the outdoor community, ASC mobilizes people who have the skills, equipment, time and motivation to provide an otherwise unobtainable resource. We are able to collect data or samples on any scale in almost any environment.

*What agencies and foundations fund your research?*

In 2013-14, ASC received grant funding from the Foundation for Youth Investment, Friends of Oak-

land Parks and Rec., Patagonia, GeoFamily Foundation, the state of Montana, National Geographic and the National Geographic Society. Fee-for-service funding was received from partner organizations including Stanford University, Sitka Conservation Society, USDA Forest Service, Helena National Forest, Discovery Student Adventures, National Forest Foundation, Arrowhead Middle School and American Prairie Reserve. ASC receives funding from private donors.

*How you would like to see your research program evolve over the next 5-10 years?*

We plan on bringing on new projects with direct conservation outcomes where our volunteers can have the greatest impact possible. As we grow, we will continue to engage larger numbers of volunteers. We will grow our staff to accommodate the growth of our volunteer constituency and project list.

*Expansion to new geographic areas?*

We are in the beginning stages of establishing place-specific projects overseas. These new projects potentially include deploying volunteers to establish and maintain remote environmental sensors in the Okavango Delta, Botswana and a wildlife study in Suriname. ASC will continue to take on new projects domestically including a snow study in Colorado and a native plant survey in the Missouri Breaks, Montana. As we grow, ASC will continue to support conservation efforts close to home and worldwide

*What other new challenges are you thinking about?*

One of the key challenges of citizen science is preserving the credibility of the data. Often, groups collect data without specific questions or applications for the data they collect. We distinguish ourselves from other citizen science efforts because we recruit, train and manage volunteers for partner groups and ensure data quality throughout the collection process.



# Rolf Vinebrooke

## University of Alberta

### Edmonton, Alberta, Canada



[rolf@ualberta.ca](mailto:rolf@ualberta.ca)  
[www.biology.ualberta.ca/vinebrooke\\_lab](http://www.biology.ualberta.ca/vinebrooke_lab)

#### **Keywords**

biodiversity, community ecology, ecosystem function, evolutionary ecology, freshwater ecosystems, global change, metacommunities, multiple stressors

#### *What are your central research objectives?*

Advance our understanding of the regional and local factors of the cumulative impacts of multiple stressors on aquatic biodiversity and ecosystem function.

Determine niche conservatism versus adaptation by major aquatic species spanning broad environmental gradients in mountains.

Integrate ecological and evolutionary processes into a framework for exploring the net effects of climate change on mountain biodiversity, ecosystem function and its services to humans.

#### *On what phenomena do you take data?*

My research group collects abiotic (e.g., meteorological, precipitation chemistry) and biotic data (e.g., phytoplankton, zooplankton, fish) from mountain lakes and ponds positioned along multiple environmental gradients, such as climatic, nitrogen deposition, and invasive species populations. We also generate and analyse data from our paleolimnological, long-term biomonitoring, and whole-ecosystem experiments.

#### *What are you attempting to predict or characterize using those data?*

We are focused on developing predictive ecological response surfaces that enable us to forecast species and whole-community responses to various combinations of climatic and pollutant stressors. Also, we conduct various experiments to test the validity of space-for-time interpretations of survey data and predictions of community responses to rapid environmental changes. Some of the implicit assumptions that we test for involve species dispersal limitation and rapid evolution.

#### *What is the geographic scope of your research?*

Our research is currently centered in the Canadian Rockies (Alberta, British Columbia) with the intention of extending our range southward into the Sierra Nevada of California.

#### *Where do you gather data?*

Our data originates mainly from within the Canadian mountain parks of Banff, Jasper, Waterton, and Yoho. Most of our research sites are located in the remote backcountry of these parks (i.e. accessible only via helicopter or multi-day hiking/biking trips).

#### *Over what geographic domain do your conclusions hold?*

The American Cordillera

#### *What agencies and foundations fund your research?*

The Natural Sciences and Engineering Council of Canada (NSERC), the Alberta Conservation Agency (ACA), and Alberta Innovates (AI).

#### *What kinds of resources does your funding provide for you?*

Student salaries, travel costs, non-major equipment and ancillary materials

*How you would like to see your research program evolve over the next 5-10 years?*

My long-term objective is to establish a series of three permanent experimental field sites (montane, subalpine, alpine) that span the entire altitudinal gradient (1400 – 2400 m asl) of our research area. Each site would contain 12 or more naturally occurring ponds from which biological inocula could be obtained to seed experimental mesocosms. These would enable long-term experimental investigations into the context dependency of the cumulative impacts of climatic and other anthropogenic stressors on aquatic biodiversity and related ecological processes.

*New methodologies for data acquisition?*

We are exploring the use of continuous meteorological and aquatic monitoring technologies for these sites.

*New methodologies for data analysis?*

A new generation of multivariate analyses in community ecology is enabling us to forecast the impacts of rapid environmental changes on the distribution of species diversity and the functional structure of aquatic communities.

*Incorporation of new disciplines into your program?*

We would very much be interested in collaborating with experts in various areas of the biogeosciences.

*Expansion to new geographic areas?*

European Alps, Pyrenees, etc...

*What other new challenges are you thinking about?*

I am also very interested in pursuing research related to the impacts of rapid melting of glaciers on lake and stream biodiversity and ecosystem function given this is a global phenomenon.





The Mountain Research Initiative

c/o Institute of Geography, University of Bern  
Erlachstrasse 9a, Trakt 3  
3012 Bern  
Switzerland

+41 (0)31 631 51 41  
[mri@giub.unibe.ch](mailto:mri@giub.unibe.ch)  
<http://mri.scnatweb.ch>