The Mountain Research Initiative

MRI Key Contact Workshop prior to the 2012 Fall Meeting of the American Geophysical Union

2 December 2012, San Francisco

The Faculty Club



Report:
The Mountain Research Initiative

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Global Change Research in Mountain Regions:
MRI Key Contact Workshop preceding AGU Fall Meeting 2012

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 2012 Fall Meeting of the American Geophysical Union. 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.

Procedure and Tools

Participants

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

Fees

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

Workshop Leader

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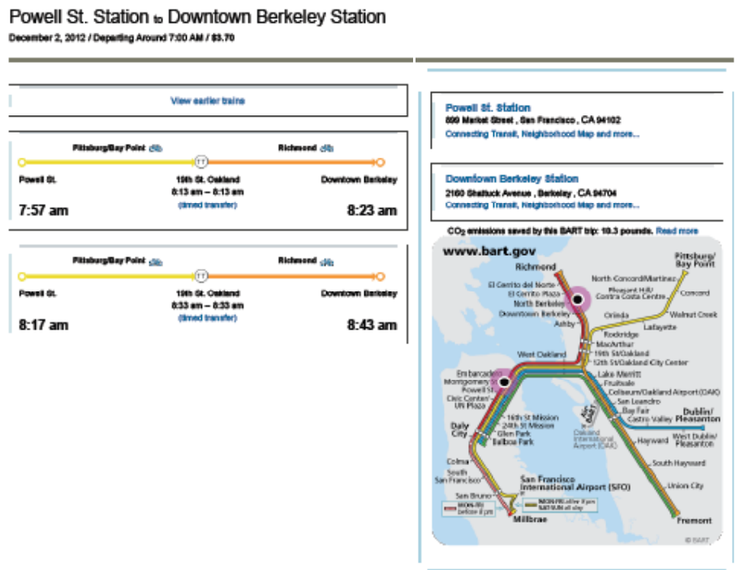
Venue

The workshop will take place in the Seaborg Room of the UC Berkely Faculty Club.
The best way to get to the campus of the University of California in Berkeley from San Francisco or another Bay Area city is to travel by BART. See the Quick Planner at **http://www.bart.gov/** to find a train that will get you from your hotel to the Downtown Berkeley station by 8:30 AM. The BART website should be able to answer your questions if you are not familiar with the system, as can station attendants. You can purchase tickets at station ticket machines.

If travelling from San Francisco, you should take the first Pittsburg/Bay point trains at 7:57 or 8:17 leaving you with sufficient time to walk to the faculty club.



From the Downtown Berkeley BART station, walk up to the campus and continue for about 10 minutes to reach the Faculty club. You can find a campus map at http://berkeley.edu/map//maps/large_map.html to guide you. Or go to Google maps to see a picture that looks like this:

If you are travelling by car see http://berkeleyfacultyclub.com/directions.

Program

Time	Activity
9:00	Registration and Coffee
9:15	Welcome and Instructions
9:30	Panel 1
10:30	Panel 2
11:30	Panel 3
12:30	Lunch and Walking Tour
14:00	Panel 4
15-15:30	Break
15:30	Panel 5
16:30	Panel 6
17:30	Closing Remarks and Evaluation
18:00	Apéro

Please note that assignment to Panels will be sent via e-mail just prior to the workshop.

The Workshop 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 flipchart 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.

After all four panel members have made their presentation, everyone will gather at tables corresponding to their respective codes (assignment will come via e-mail) for up to 40 minutes of interdisciplinary thinking, comments, and suggestions to the presenters, who will lead discussion of their research ideas. All participants should stay with their assigned table for the first five or ten minutes, but thereafter participants can move to another other panel. The cycle then repeats. We will have three sessions before lunch, and three after.

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 wants to.
- 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.

Material for Working Groups

- 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 working group number (e.g., B3) and a short heading on the flip chart and uses it as a mind map documenting the discussion and ideas (unfiltered!).

3. The Chair can present any topic but as a default, the following three questions can be used:
   i. How could the presented research be improved? (free brainstorming, focus on “what?”)
   ii. Which other discipline/approach/methodology would shed new light on the proposed research? (focus on “how?”)
   iii. 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

RESEARCH SUMMARIES

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What are your central research objectives?

The central research objectives are to: improve the understanding of climate change and environmental evolution in remote mountain and marine regions by supporting and promoting in situ measurement networks; study the impacts of climate changes and help to formulate adaptation strategies; promote technological research to overcame obstacles we meet in studying of remote areas; develop a multidisciplinary portal of access to metadata and data on scientific and technological research activities in mountain and marine areas; develop a center for retrieval and analysis of data and numerical simulation in mountain regions and support local government level decision-making and promote transfer of skills and technologies.
In particular, I am interested in weather/air quality/climate interactions, especially in understanding the sources of pollution reaching high mountains that affect local air quality, monsoon and regional climate.

On what do you take data?

Our project acquires the following data:
1. Local climate: measurement of meteorological
2. Atmospheric background and polluted conditions (e.g. ABC)
3. Deposition effects of absorbing aerosol on the cryosphere.
4. Glacier retreat and water availability.
5. Water quality (hydrochemistry, biology, precipitation analysis).
6. Local climate variations (paleoclimatic and dendrocronogical analysis).
7. Biodiversity response of global warming.
8. Indoor pollution and effects on human health.

I personally focus on simulating the concentration of pollutants, such as black carbon and dust particles, using mathematical chemical transport models in 4D (three dimensions of space and time). These pollutants are transported long distance by meteorological variables thus I simulate the meteorological variables as well.

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

The NextData (a national system for the retrieval, storage, access and diffusion of environment and climate data from mountain and marine areas) and the SHARE (Stations at High Altitude for Research on the Environment) actions are focused mainly in developing countries and in protected areas. For this reason the data collection, their archive and elaboration of models are important to improve scientific knowledge on environmental phenomena, but also to provide information to develop correct natural resources management and conservation processes at the local level.
In particular, within the NextData and SHARE frameworks, I am trying to understand the atmospheric processes (meteorological/air quality) over mountain areas. Computer based numerical weather prediction is now widely used to forecast/hindcast meteorological phenomena over the world. With advances in computing technologies, these tools have increased their prediction skills.

What is the geographic scope of your research?

The NextData project promotes a monitoring programme in remote areas In particular, for mountain regions NextData support the SHARE network, that includes stations in Asia (Himalaya and Karakorum), Africa (Rwenzori) and Europe (Alps and Apennines) and South America (Andes and Chile)
In the framework of NextData and SHARE projects, I am focused, in particular, on the processes affecting the Himalayas. In order to characterize transport of pollutants from long distances, I run computer simulations covering most of Asia from approximately 2N latitude to 40N and from 30E longitude to 135E.

Geographic scope: Where do you gather data?

All data collected within NextData and SHARE will be gather in a portal of access to data, ongoing construction. This portal will include the archive of high altitude observation networks (data collected within SHARE); archive of marine observational networks and climate reconstruction; archive of data from non-polar ice cores and long-term biological data, archive of paleoclimatic data from sediment core and archive of numerical simulation and projections.
At present data from most AWSs are on server based at the Ev-K2-CNR Committee, NCO-P data are on UNEP- ABC-Disc, trace gas data are on WMO-GAW-WDCGG web-sites and Mt. Cimone data is available at EBAS website. Himalayan AOD are on NASA/Aeronet website and limnological data via the ILTER website.

Over what geographic domain do your conclusions hold?

Primarily, NextData's and SHARE's conclusions hold to a regional scale, providing an outlook of environmental conditions characterizing the extreme regions where the scientific activities are carried out. However the information produces by these projects can be very useful from a global perspective. In particular, mountain areas can be considered representative of greater spatial areas.

What agencies and foundations fund your research?

Network funding and ongoing research activities are made possible thanks to the continuous support of the Ministry of Education, Universities and Research, the Italian National Research Council and the Italian Ministry of Foreign Affairs – in collaboration with the United Nations Environment Programme (UNEP). Other specific studies / technological elements are funded by Italian regional authorities and private sponsors.

What are the time horizons of your funding?

NextData is on a four-year (2012-2015) funding scheme, while SHARE currently is on a tree year (2011-2013) funding scheme, with a perspective of continuation through 2015.

What kinds of resources will your funding support?

Human resources (post-doc and young scientists,) collaboration with Italian and international scientific institutions and their laboratory services, including CNR and Universities and participation of local technical staff and scientific institutions. Scientific equipment and instruments, and communications, publications and dissemination efforts.

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

Development of the existing monitoring network and implementation of new monitoring stations in Pakistan, in Italy, in South America, in Africa.
Expansion of collaboration and improvement of coordination with national and international agencies (eg. GEO/GEOSS, UNEP, WMO - GAW..).
Implementation of center for numerical model with the development of chemical transport models in order to provide a means to link sources/sectors with sinks/regions which can be used by the policy makers as a decision support tool to make informed decisions about mitigation/coping with changing weather/air quality/climate.
The above mentioned point can be resumed in the establishment of a national "Network of Excellence" for the measurement, storage analysis and interpretation of climate and environmental data, in order to make them available to the scientific community, management organizations and companies. A physical archive of non-polar ice cores will be available too.

New methodologies for data acquisition?

NextData and SHARE are developing special methods for data measurement transmission and storage, and for reducing the impact of scientific and sampling activities, which are appropriate in remote regions with difficult environmental conditions and poor accessibility. Tests are currently underway to allow the improvement and employment of a measurement system for atmospheric parameters and air quality, which can easily be transported to high altitude regions, while special techniques for ice-core analysis are also planned.
Moreover, within this context the acquisition of data collected in situ is standing next to use of satellites data.

New methodologies for data analysis?

Specific methodologies should be adopted to promote an integrated approach based on ground observations. In particular, in order to improve data elaboration processes using modeling tools the use of computing models to simulate the environment is necessary. These models are continuously evolving and modeler's will always need to incorporate the new models, algorithms, etc as they evolve for improving simulations and analysis.
Moreover, the projects will make available an integrated computerized system supplying technical-scientific support to decision makers for the definition of appropriate knowledge-based environmental and climate policies.

Incorporation of new disciplines into your program?

Within NextData and SHARE new pilot project will be promoted in order to improve knowledge on how the cryosphere and water resources in general are responding to anthropogenic pressure factors, on changes in biodiversity and ecosystems in mountain areas, on climate change effects on health in mountain regions.

Expansion to new geographic areas?

Expansion to South America is in the planning stages and the installation of a new atmospheric station in HKK (Hindu Kush Karakoram) region is also foreseen, with perspective of expansion in other regions, which projects are now in progress of definition.

What other new challenges are you thinking about?

In close collaboration with UNEP, NextData and SHARE supports sustainable development of mountain regions and improves local environmental management systems by transferring technology and know-how in the fields of environmental and geophysical sciences.
In the framework of modeling activities the main challenge is that to explore how air quality perturbs day to day weather, combining of regional model output with impact studies model such as hydrology, agriculture, health, ecosystems and economics.

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What are your central research objectives?

The American Climber Science Program (ACSP) brings researchers together in integrated research expeditions to holistically examine certain mountain ranges. The ACSP organizes mountain research expeditions so that different research teams can go into the field together and share logistics so that expeditions are significantly cheaper for each researcher. The goals of the ACSP are to work with local land managers and researchers to examine environmental interactions in specific mountain regions by combining multiple high quality projects simultaneously so that research synergies emerge. We look for projects that are publishable and fundable by agencies such as the NSF and that also meet the needs of local stakeholders.

On what do you take data?

We work with local stakeholders and interested scientists to develop our research plans. In 2012 our expedition to the Cordillera Blanca examined water quality (inorganic and organic contaminants), grazing and fire impacts on vegetation (grass/woody species interactions), aerosol deposition on glaciers (black carbon, dust, and wind blown mine tailings), CO2 concentrations (in vegetated, bare rock, and glacial areas), and took atmospheric optical depth measurements.

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

The ACSP is building a repository of field techniques, broadening the knowledge base, and creating the education tools needed in these harsh, rapidly changing regions. More importantly, we are helping devise useful adaptive land management practices in conjunction with local land managers and policy makers. We have already conducted successful expeditions in 2011 and 2012 that gathered a great deal of data and have led to several publications and grant proposals to agencies such as NSF, NASA, and USAID. Our work is in conjunction with many Peruvian stakeholders including local Universities, National Park officials, and national Ministries and is responsive to their expressed needs for environmental information.

What is the geographic scope of your research?

Currently our main focus is in the Cordillera Blanca of Peru, but in conjunction with the American Alpine Club and other groups, we are considering expanding in the Andes and into Nepal.

Geographic scope: Where do you gather data?

See above.

Over what geographic domain do your conclusions hold?

Currently our main focus is in the Cordillera Blanca of Peru, but in conjunction with the American Alpine Club and other groups, we are considering expanding in the Andes and into Nepal.

What agencies and foundations fund your research?

We have received funding from the American Alpine Club, the Canadian Alpine Club, various industry partners such as Black Diamond and Petzl, the National Science Foundation, etc. We have pending grants with USAID, the Blue Moon Foundation, NASA and the NSF.

What are the time horizons of your funding?

We are in an ongoing cycle of fundraising for the next five years.

What kinds of resources will your funding support?

Expedition logistics, sample analysis, student travel support, Peruvian and other local participation in the research - especially Peruvian graduate students, long-term monitoring and equipment installation in conjunction with the local Universities.

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

We would like to develop strong partnerships with managers and stakeholders in several areas where climbers visit frequently such as Patagonia, and the Central Himalayas in addition to the Cordillera Blanca. Such a geographic spread would allow us to gather data at low, mid, and high latitudes and would supplement the extensive data gathering that occurs in the US, Europe, and the Arctic.

New methodologies for data acquisition?

We are actively developing a variety of techniques for data collection in harsh environments that can be carried out by volunteer climbers, local students, and other potential participants. Such efforts are actively guided by the PI scientists in the field. We are working on water quality, snow collections, solar optical depth, and vegetation analysis.

New methodologies for data analysis?

We have several analytic chemists who are finding novel ways to analyze our data. For example, using a Ramen laser, we discovered Arzakite (a mercury sulfide) in snow samples. This mineral likely results from mining activities but it turns out that it is not stable under higher humidity conditions so we will have to devise new ways to address these limitations.

Incorporation of new disciplines into your program?

We definitely are trying to pull new collaborators into our Program. We are seeking geologists to link to the inorganic water quality, wildlife biologists to link to our vegetation work, etc.

Expansion to new geographic areas?

Yes, to Chile and Nepal in the near future.

What other new challenges are you thinking about?

Addressing the needs and challenges of stakeholders immediately adjacent to mountain regions is a future goal once our Program has established itself within our principle areas and begun long-term data acquisition.

Heidi Asbjornsen

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What are your central research objectives?

The overarching objective of my research program is to understand the interactions and feedbacks that occur at the interface between ecological and hydrological systems, with an emphasis on the water cycle and the linkages between coupled water, nutrient and carbon cycles. Within the larger objective, a particular emphasis of many of my research projects is to quantify the role of vegetation in controlling water fluxes and flowpaths from individual leaves and whole plants to ecosystems, watersheds, and landscapes, as well as how these processes are affected by land use conversion, climate change, and other global change drivers. Ultimately, the results of this work is relevant for supporting decision making processes related to managing natural resources for multiple ecosystem services, including water quality, flow regulation, carbon sequestration, biodiversity, and recreational services.

On what do you take data?

I collect data on different aspects of plant water relations, and link these with data on carbon, water, and nitrogen cycles, including the following specific measurements: sap flow, stable isotopes of leaf and tree ring tissues (13C, 18O, 15N, microclimate conditions (solar radiation, VPD, wind, etc.), leaf gas exchange, and a range of other tree physiological and structural characteristics. Additionally, I often work with larger teams that are involved in collecting complementary data on canopy fluxes of CO2 and H2O, micrometerological data, streamflow, runoff, groundwater dynamics, soil respiration, soil physical and hydraulic processes, and other measurements critical to ecohydrological research.

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

The pools and fluxes of water through the soil-vegetation-atmosphere-stream continuum and how these pools and fluxes of water interact with carbon and nutrient cycles and, ultimately, influence productivity and resilience to drivers of environmental change, such as climate change, land use, and atmospheric deposition.

What is the geographic scope of your research?

Tropical and temperate regions, primarily across the Americas.
I am also involved in leading a NSF-funded Montane Cloud Forest Research Coordination Network, which is global in scope and will host its first meeting in June, 2013 in conjunction with the Association for Tropical Biology and Conservation meeting.

Geographic scope: Where do you gather data?

Northeastern deciduous hardwood forests in the White Mountain region of the U.S. (NH)
Midwestern corn belt region of the U.S. (IA)
Continental US (including 8 long-term research sites with eddy covariance flux towers, including several sites in mountain regions)
Mexico (Montane cloud forest ecosystems in Xalapa and Oaxaca, bioenergy systems in the Yucatan)
Costa Rica (focusing on elevational gradients at 3 different sites: La Selva, Monteverde, Santa Rosa)
Argentina
Brazil

Over what geographic domain do your conclusions hold?

Temperate and tropical regions, primarily across the Americas, but with broader implications for similar regions globally.

What agencies and foundations fund your research?

National Science Foundation, NASA, Northern States Research Cooperative, USDA Forest Service, USDA Agriculture and Food Research Initiative, Conservation, Food, and Health Foundation.

What are the time horizons of your funding?

Usually 3-5 years.

What kinds of resources will your funding support?

Equipment, supplies, graduate students, post-doctoral research associates, partial salary for researchers, travel, communication, etc.

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

„1) Expansion of my research program to include new international collaborations and research sites, especially focusing on aspects of ecohydrology and climate change in mountainous regions;
2) Development of research projects that have greater interdisciplinary focus, including understanding complex interactions between the ecological, social, and economic systems;
3) Creation of new student and graduate student exchange programs and/or off-campus study programs with international institutions and research collaborators;
4) Implementation of a long-term rainfall manipulation experiment to understand responses of northern hardwood forests to climate change, especially increasing occurrence of drought.“

New methodologies for data acquisition?

„1) Expansion of use of stable isotope techniques for understanding multiple ecological and hydrological processes;
2) Integration of stable isotope techniques with landscape scale measures obtained with eddy covariance and remote sensing technologies;
3) Application of new techniques for measuring leaf-level traits related to gas exchange and structural characteristics;
4) Analysis of phloem and sap for nutrient levels and stable isotopes to examine relationships between plant response and microclimate variability at greater temporal resolution. „

New methodologies for data analysis?

„1) Application of ecosystem models to assess future climate change response;
2) Improvement of existing models to assess trade-offs among different ecosystem services by incorporating a more realistic representation of hydrologic processes;
3) Methods for scaling data from the leaf to landscape scales.“

Incorporation of new disciplines into your program?

„1) Greater collaboration with social science researchers as part of interdisciplinary projects.
2) Continued collaboration with hydrologists, soil scientists, micrometeorologists, etc.
3) Greater collaboration with modelers focusing on both ecosystem models and global circulation models.“

Expansion to new geographic areas?

I will be expanding my research into several new regions of the Americas over the coming years (Brazil, Argentina, the Yucatan of Mexico, Costa Rica), and am also open to new collaborations in other regions of the world.

What other new challenges are you thinking about?

As part of the Research Coordination Network on Tropical Montane Cloud Forests that I am co-leading, a major challenge will be to work towards formulating a more integrated global understanding of the ecology and management of TMCFs, as well as developing a standard approach for data collection in these regions across different disciplines.

Michel Baraer

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What are your central research objectives?

My central research objective consists in assessing the impact of climate changes on hydrology / water resources in different mountainous environments. More specifically, I study the impact of glaciers retreat on downstream hydrology.
My researches are usually made of two components: a hydrological processes characterization and a numerical modeling. The hydrological processes characterization is based on use of natural tracers such as major ions and stable isotopes of water.

On what do you take data?

Data collection consists in field measurements at the watershed scale and lab analysis of water samples. I usually take water samples of possible water sources (glaciers, snow, groundwater, etc...) and of surface water. Studied watersheds are equipped with meteorological and hydrometrical stations.

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

Results from water samples analysis are used to identify conservative tracers. These tracers help identify contributing sources and quantifying their contributions. Meteorological and hydrometrical time series are used for numerical modeling. Models reproduce and project climate changes impact on surface water (streams) characteristics such as average discharges and variability.

What is the geographic scope of your research?

Tropical Andes so far. I am currently working on applying the methods I use in the arctic.

Geographic scope: Where do you gather data?

Data are collected at high valleys of the tropical Andes.

Over what geographic domain do your conclusions hold?

Tropical Andes and, to certain extend, to all watersheds that host alpine glaciers.

What agencies and foundations fund your research?

NSF (through the OSU) and NASA.

What are the time horizons of your funding?

2 years.

What kinds of resources will your funding support?

Logistic and analysis.

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

Same central research objectives but applied to both the Arctic and the tropical Andes.
I am planing to open the projections from my model to not only the discharge characteristics but also to other water resources parameters such as the water quality.

New methodologies for data analysis?

Infrared imagery, ADCP.

Incorporation of new disciplines into your program?

Water quality-

Expansion to new geographic areas?

Arctic.

Ana Barros

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What are your central research objectives?

To measure, model and understand the water cycle in mountainous regions.

On what do you take data?

Meteorology, Clouds, Aerosols, Rain and Snow (microphysics and quantity), Soils, Surface Fluxes.

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

Water fluxes and land-atmosphere interactions/feedbacks and in particular, precipitation at high spatial and temporal resolution .

What is the geographic scope of your research?

Himalayas, Andes, Appalachians.

Geographic scope: Where do you gather data?

Himalayas (central), Andes (eastern slopes), Appalachians (southern).

Over what geographic domain do your conclusions hold?

See above.

What agencies and foundations fund your research?

NSF, NASA.

What kinds of resources will your funding support?

Graduate student support, some equipment.

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

Toward parsimonious integration of satellite data, high resolution end-to-end surface networks and super-high resolution models.

New methodologies for data acquisition?

Autonomous self-organizing networks coupled with traditional high resolution observations
Integrated meteorological-hydrological-ecological-geomorphological observing systems.

New methodologies for data analysis?

Integration with super-high resolution physics models.

Incorporation of new disciplines into your program?

Glaciology, Geomorphology and Ecology of high elevation grasslands.

Expansion to new geographic areas?

Africa and further south in South America.

What other new challenges are you thinking about?

Land-Use and Land-Cover change on water and energy resources.

Alexis Berne

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What are your central research objectives?

Precipitation in mountainous regions, focus on the Alps:
- polarimetric radar measurement of alpine rain- and snowfall
- microphysical processes
- small-scale variability

On what do you take data?

Alpine precipitation (liquid and solid) from X-band polarimetric radar, disdrometers.

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

Better understand precipitation dynamics and microphysics, key issues for improving numerical weather model simulation and prediction capabilities.

What is the geographic scope of your research?

Alps, hilly/mountainous region southern France (within HyMeX project).

Geographic scope: Where do you gather data?

Idem

Over what geographic domain do your conclusions hold?

Primarily for the Alps, but probably some more general features.

What agencies and foundations fund your research?

Swiss NSF
EPFL

What are the time horizons of your funding?

2-3 years.

What kinds of resources will your funding support?

Field campaign (HyMeX, Swiss Alps)
Man power: PhD students, postdocs

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

Further collaborate with atmospheric community (NWP models, climate scenarios) and hydrological/natural hazards community (water resources, floods/avalanches).

New methodologies for data acquisition?

I am convinced that synergies between sensors will help collecting innovative and unprecedented data sets about various processes interacting at various scales.

New methodologies for data analysis?

With more complex data comes the need for more complex data analysis tools...

Incorporation of new disciplines into your program?

As mentioned above, I foresee collaborations with „upstream“ communities (atmosphere, meteorology) and „downstream“ (hydrology, natural hazards, ecology). Here „upstream“ and „downstream“ are used with respect to precipitation.

Expansion to new geographic areas?

If possible! Polar regions, other mountain ranges.

Franco Biondi

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What are your central research objectives?

My long-term scientific goal is to understand how ecoclimatic factors control landscape patterns and processes in present, past, and possibly future environments. I pursue this goal using natural archives, especially tree rings, which I study at multiple spatial and temporal scales (for instance, I use either multi-century long tree-ring chronologies as well as half-hour stem size measurements).

On what do you take data?

Tree-ring data are used to quantify climatic change, wildfire regime, woodland species dynamics (at the lower and upper treelines), and biogeographic/ecoclimatic regions.

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

Data are used to define a baseline record of natural variability, to be used for the determination of ecological reference conditions, which in turn guide conservation and restoration of natural landscapes and ecosystems by providing a baseline for measuring the effects of past and present activities. Emphasis is placed on responses to regional climatic modes, such as the North American monsoon, and on the application of research results to watershed and natural resource management, particularly in terms of drought planning, fire use, and old growth conservation.

What is the geographic scope of your research?

Mountains in arid and semi-arid regions in the mid-latitudes, treeline sites in the tropics.

Where do you gather data?

Great Basin, USA (see http://dendrolab.org/gb_climate.htm), Central Mexico (see http://dendrolab.org/mexico.htm), Italian Apennines and Alps.

Over what geographic domain do your conclusions hold?

Western North America, Tropical North America (NAMS region), Mediterranean Basin.

What agencies and foundations fund your research?

Mostly NSF.

What are the time horizons for your funding?

Currently the next 2 years or so are covered.

What kinds of resources will your funding support?

Grad students, equipment, travel, lab technician.

The future: How you would like to see your research program evolve over the next 5-10 year

More analysis of actual climate-tree growth relationships at multiple time and spatial scales, especially using intens in situ observations and experiments.

New methodologies for data acquisition?

Remote download of sensor data. Image analysis of tree-ring anatomical properties.

New methodologies for data analysis?

Expanded eco-physiological measurements. Process-based modeling of tree growth. Bayesian analysis.

Incorporation of new disciplines into your program?

Linking models of landscape change with actual observations of landscape-level climate, disturbance, and vegetati dynamics.

Expansion to new geographic areas?

Possibly.

What other new challenges are you thinking about?

More integration with existing large-scale efforts, hopefully through MRI.

Giuseppe Feola

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What are your central research objectives?

My research aims to uncover the dynamics of institutional adaptability and resilience to environmental change in peasant communities in the Colombian Andes. It aims to provide the necessary knowledge basis for policy makers and other actors to develop climate change adaptation strategies to contribute to food security and sustainable rural development.

On what do you take data?

I collect data on social institutions (e.g. land inheritance rules, reciprocity), i.e. how they are structured, how they work and respond under environmental change, and how they perform in terms of rural systems resilience and sustainability.

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

I attempt to characterize how social institutions are performing (are they enabling or hindering farmers to adapt to environmental change?), and whether they are evolving/adapting (are they 'fit'?), under the current pressure of environmental change.

What is the geographic scope of your research?

Colombian Andes.

Where do you gather data?

In the field through interviews, surveys and observation in selected peasant communities in the Colombian Andes (Cordillera Oriental). I also use secondary data (i.e. official statistics).

Over what geographic domain do your conclusions hold?

The practical, i.e. policy-relevant, conclusions of my work hold at local level. Nevertheless, at a more theoretical level, many of the mechanisms of institutional adaptation to environmental change observed in my work could be in place in other peasant and rural communities in different regions.

What agencies and foundations fund your research?

My research is currently funded through seed money by the School of Human and Environmental Sciences and the Walker Institute for Climate Systems Research, both at the University of Reading. I am pursuing further and more significant funds from other sources.

What kinds of resources will your funding support?

Fieldwork-related activities.

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

I would like to build a research group with several graduate students, postdocs, stable research income, and strong international network.

New methodologies for data analysis?

Simulation modeling (e.g system dynamics, agent-based).

Incorporation of new disciplines into your program?

There is room in my research for strengthening the integration of several environmental and natural sciences.

Expansion to new geographic areas?

Not envisaged as yet, but my research could potentially be extended to other communities in the Andean region.

What other new challenges are you thinking about?

Should science play a more active role to promote a social transformation in the face of environmental change?

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What are your central research objectives?

To understand the spatial and temporal patterns of soil depth change and sediment concentrations in agricultural landscapes in the Ethiopia highland areas.

On what do you take data?

Rainfall, storm flow, ground water table height, sediment concentration, soil depth change, 137Cs, soil nutrients (N,P,K, Mg, Ca) .

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

Temporal patterns and spatial areas of high vulnerability to erosion to prioritize soil and water conservation to these locations and times.

What is the geographic scope of your research?

Ethiopian Highlands (between 2000m to 3000m) at the watershed scale in sub-humid to humid semi-monsoonal conditions.

Where do you gather data?

Debre Mewi Watershed 25 km south of Bahir Dar, Ethiopia.

Over what geographic domain do your conclusions hold?

At the 10 ha to 100 ha watershed scale in semi-monsoonal tropical climates.

What agencies and foundations fund your research?

Food Systems and Poverty Reduction IGERT, NSF Program
NSF GRFP
PEER Science, USAID National Academy of Sciences

What kinds of resources will your funding support?

Research funds for equipment, analyses, airfare, domestic travel, labor costs, stipend, tuition.

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

I would like to work to develop a research site similar to those established by Soil Conservation Research Program in the Ethiopian Highlands that collects soil erosion research data as well as incorporates community members in researching and designing soil conservation strategies.

New methodologies for data acquisition?

^{137}Cs, ^{210}Pb, for stream collected sediment.

New methodologies for data analysis?

Stochastic hydrology analysis (Historical flood analysis) to assess the extent to which limited data collection can be used with other sources of information to develop trends in hydrological data.

Incorporation of new disciplines into your program?

Action research, Anthropology for the development and design of community supported soil conservation strategies.

Expansion to new geographic areas?

Honduras, Ecuador, Thailand.

What other new challenges are you thinking about?

The management of excess water for irrigation during dry season.

Katya Hafich

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What are your central research objectives?

My central research objective is to determine the source of elevated nitrate in surface waters of an alpine catchment. Nitrate concentrations have been steadily increasing in Green Lakes Valley for the last 30 years, due to increased atmospheric deposition (in rain, snow, and dry deposition) and possibly increased geochemical cycling of nitrogen in barren soils and talus. Glacier and rock glacier melt could also be contributing to increased nitrate levels in outflow of Green Lakes Valley. Using the delta O17 isotope, I plan to determine percentage contribution of atmospheric versus terrestrially produced nitrate.

On what do you take data?

I collect water samples from surface waters, soil water, groundwater, rock glacier melt, water draining talus slopes, rain, snowmelt, and snow. I am also collecting data on soil moisture and temperature at three talus sites in Green Lakes Valley. I will use climate data currently being collected in Green Lakes Valley through the Niwot Ridge Long Term Ecological research site.

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

I am attempting to characterize the source of nitrate in all different water types from Green Lakes Valley using the triplicate oxygen isotope approach. I hope to also characterize residence time of atmospherically deposited nitrogen in an alpine valley, across several water type regimes (soil water, ground water, surface water).

What is the geographic scope of your research?

My research is primarily located in Green Lakes Valley, on the continental divide at the headwaters of Boulder Creek near Boulder, Colorado. The results will apply to alpine headwater catchments experiencing increased nitrogen levels across the Rocky Mountains, the Sierra Nevada, and in Europe.

Where do you gather data?

Data is collected at the Niwot Ridge LTER, mainly focused on Green Lakes Valley within the LTER.

Over what geographic domain do your conclusions hold?

The results will apply to alpine headwater catchments experiencing increased nitrogen levels across the Rocky Mountains, the Sierra Nevada, and in Europe.

What agencies and foundations fund your research?

The research is funded through the National Science Foundation, through a grant entitled „The Role of Dust on Snow and Other Aeolioan Inputs in Soil Formation and Biogeochemical Cycling in Barren, Alpine Catchments“, PI Mark Williams.

What are the time horizons for your funding?

This is a 3 year grant, ending in Spring of 2014.

What kinds of resources will your funding support?

„The funding supports installation of increased instrumentation in Green Lakes Valley (soil lysimeters, soil moisture and temperature probes). Also, the grant is funding outreach through the St. Vrain Math Engineering Science Achievement (MESA) program, supporting independent research projects for several high schoolers.
Several publications are also expected as a product of the research, and one has already been published;
Mladenov N, Williams MW, Schmidt SK, and Cawley K. (2012) Atmospheric deposition as a source of carbon and nutrients to barren, alpine soils of the Colorado Rocky Mountains. Biogeosciences Discuss.(9): 2375-2424.“

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

This research contributes to a large body of research on biogeochemical cycling at high elevations. As a masters student, I feel privileged to be part of such a rich body of knowledge that is rapidly growing. I hope that my work contributes to future work on the contribution of barren soils and talus in alpine catchments geochemical cycling in alpine areas. The delta O17 isotope is a new method that has not yet been used in alpine catchments, and I expect that my work with nitrate and water quality will be just a beginning exploration of the use of the method.

New methodologies for data analysis?

The triplicate oxygen isotope is a new method that has not been used in an alpine catchment yet.

Incorporation of new disciplines into your program?

Biogeochemical cycling is by nature a multidisciplinary topic, and this grant incorporates research from several different disciplines; hydrology, ecology, geology and climatology.

What other new challenges are you thinking about?

I am very interested in education and outreach, especially as nitrogen deposition is significantly changing alpine ecosystems in the Colorado Rockies. The challenge presented is how to communicate the effects of nitrogen deposition to the public, especially since is an anthropogenic phenomenon. Currently, I teach an activity on the nitrogen cycle in the public schools one day a week through the CU Biological Sciences Initiative Science Squad. Students are receptive to the material when presented in a fun, interactive way. I also am participating in a new outreach initiative, ScienceLive as a featured scientist. I hope to engage students digitally through video blogs and available curriculum about my research on nitrogen cycling. One challenge I consider is communicating to the general public, beyond school-aged children. Geochemical cycling is not the most exciting or newsworthy topic, but has many implications for ecosystem and human health.

Peter Hartsough

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What are your central research objectives?

We are looking at ecosystem processes, ecosystem services and the interplay between the two along an elevational transect from the central valley of California at about 200m to near the Sierra crest at ~2700m. We use the transect as a space for time experiment to study the dynamics of the physical and biological processes as we go from a rain to snow dominated system.

On what do you take data?

Precipitation, soil physical and chemical properties, fluxes of mass and energy into and out of the canopy, stream flow,.

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

The hydrologic cycle in the mountains across the rain to snow transition. The interplay between the subsurface, soil formation, physical and biotic perturbations to this system.

What is the geographic scope of your research?

In a series of nested catchments in the southern Sierra Nevada, California, USA.

Where do you gather data?

The Kings River Experimental Watershed is the primary site plus an additional three sites along the elevational transect.

Over what geographic domain do your conclusions hold?

Certainly the entire Sierra Nevada, but also with broad implications across the western US and indeed to mountain ranges worldwide. Basic mountain hydrology research.

What agencies and foundations fund your research?

National Science Foundation.

What kinds of resources will your funding support?

Funding for major instrumentation and ongoing monitoring.

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

Our work focuses on monitoring and process modeling. We would like to continue to monitor along an elevational transect spanning the rain to snow transition. We would like to document changes in ecosystem processes associated with climate change.

New methodologies for data acquisition?

We are always thinking about better ways to make measurements. These include but are not limited to, snow depth and water content, soil water content and matric potential, measurements within tree canopies and from adjacent flux towers. We also continue to find new ways to get data out of the mountains using cell towers, wifi, and satellite connections.

New methodologies for data analysis?

We are building models that span the soil-plant-atmosphere continuum from the scale of one tree up to the entire catchment.

Incorporation of new disciplines into your program?

We have a interdisciplinary team at this point but would like to continue to blend our team with a combination of physical scientists and ecologists.

Expansion to new geographic areas?

The CZO is part of a larger observatory network, at this point consisting of 6 observatories scattered across the country. In the next phase, we would like to include more inter-site projects including having students that work on projects across sites.

What other new challenges are you thinking about?

We are always thinking about ways to use the observational network for teaching. For the past three years I have taken an Environmental Monitoring class up to the site to do field instruction on how to install and use various instruments in the context of montane catchment monitoring. We are interested in new ways to both get students up into the mountains for hands on research and also get data streams back from the mountains that the students can use, often in real time.

David Inouyue

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What are your central research objectives?

My research has been based at the Rocky Mountain Biological Laboratory since 1971. I have a variety of long-term research projects there, but my main focus at present is on how the phenology and abundance of flowering are responding to the changing environment, and how changes in flowering are in turn affecting interactions such as pollination and seed predation. More broadly, I'm interested in how climate change is affecting animal phenology (e.g., migration, hibernation), altitudinal distributions (e.g., of bumble bees), and pollinator phenology. I've also been studying how snowpack and snowmelt date interact to influence the probability of spring frost damage to plants, and how those effects cascade through the ecosystem.

On what do you take data?

Phenology and abundance of flowering by about 120 species of plants in 30 2x2m plots since 1973, with more recent additions of plots for watering and warming treatments. Flowering by two mast-flowering species (Frasera speciosa, Veratrum tenuipetalum). Demography of three species for which we have followed individual plants since as far back as 1973. Abundance of insects caught in a Malaise trap (48 hours/week, all summer, since 1984).

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

Characterizing patterns (means and variation among years) of flowering, associating them with changes in the environment (particularly snowpack and snowmelt dates). Following how mast flowering is changing in response to changing precipitation and temperature, how plant demography varies over altitude and over years, and how insect abundance measured by a Malaise trap varies over seasons and years.

What is the geographic scope of your research?

Colorado Rocky Mountains.

Where do you gather data?

Rocky Mountain Biological Laboratory, Colorado. 2900m. And nearby environments.

Over what geographic domain do your conclusions hold?

Probably broadly over the Rocky Mountains, but probably to other mountain areas as well.

What agencies and foundations fund your research?

NSF's program Long-Term Research in Environmental Biology (through 2018).

What kinds of resources will your funding support?

Postdoc, field station expenses, summer support for graduate student and research assistants.

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

I plan to continue the long-term observational studies, and the more recent manipulative studies. I would like to expand phenological observations to a broader set of animal species (especially pollinators). And possibly begin monitoring of altitudinal distributions of both plants and animals. I'd also like to expand some ongoing work looking at how the ratio of snow to rain is changing at different altitudes in the Rocky Mountains.

New methodologies for data acquisition?

I may try radio tags on hummingbirds (to find nests to monitor nesting phenology), maybe on bumble bees. May move to recording data on computers rather than paper.

New methodologies for data analysis?

Some additional statistical and modeling methods (especially by postdocs).

Incorporation of new disciplines into your program?

Climatology. Physiological ecology. Want to collaborate?

Expansion to new geographic areas?

Probably not, but might get back to Australia's Snowy Mountains some time to repeat a flowering phenology study, to the University of Colorado's Mountain Research Station to locate and get GPS coordinates for a previous study of flowering phenology.

What other new challenges are you thinking about?

Learning more about large-scale weather patterns and how they influence the local environment where I work.

Jan Klimeš

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What are your central research objectives?

We investigate landslides and glacial lakes outburst floods (GLOFs) hazard in relation with climate variables (precipitation and temperature). Our research is focused on high, glaciated mountains in the tropics – Cordillera Blanca.

On what do you take data?

We collect data mainly on landslide and GLOF events which caused damage to local inhabitants. We describe geological conditions of their occurrence, their causes, development and resulting land forms as well as caused damages.
Since 2008 we operate one rain gauge and eight soil moisture sensors on moraine dams of two glacial lakes. The moraine material from these sites is being investigated in detail in terms of basic mechanical and hydrological soil properties (e.g. granulometry, hydraulic conductivity, shear strength). Plus we use other precipitation data provided by Department of Glaciology and Water Resources, ANA, Peru.
We also compile regional historical databases of landslide and GLOF events analyzing their occurrence frequencies and causes with respect to climatic variables (mainly precipitations and temperatures), which are strongly affected by El Nino/La Nina phenomena.

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

On the local level, we characterize the conditions (e.g. precipitations) under which the researched moraine dam slopes may be unstable and could potentially cause landslides which subsequently may trigger outburst flood.
On the regional scale we look for patterns of landslides and GLOF occurrences with respect to long term precipitation and temperature variations.

What is the geographic scope of your research?

We work in the Cordillera Blanca Mts., Peru. Most of our work is centered between the towns Huaraz – Yungay.

Geographic scope: Where do you gather data?

The data are being collected in the same region as described above. We focus on the glacial valleys and lakes in general above 3800m asl. The glacial lakes which are investigated in detail are Lake 513, Palcacocha and Uruashraju.

Over what geographic domain do your conclusions hold?

Our conclusions have either local validity or hold for the Cordillera Blanca Mts. or in some cases for the Central Cordillera of Peru.

What agencies and foundations fund your research?

We are funded by Czech state either through grant agencies of different ministries or by the main scientific foundation – Czech Grant Agency.

What kinds of resources will your funding support?

Finances to travel to the location as well as to buy measurement instruments.

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

On the regional level, we want to shift our research from altitudes between 3800 – 4800m asl closer to the glaciated peaks (in general above 5000m asl), where the most dramatic changes due to glacial retreat may be expected.

On the global level, we want to establish database collecting all available information about GLOFs from all high altitude mountains around the world. We want to collected data abut GLOFs occurrence times, causes, magnitudes and consequences. We hope that such database, which will integrate available historical as well as recent information will lead to better understanding of the GLOF hazard and its relation with observed climate change in different geographical regions.

New methodologies for data acquisition?

We will investigate the possibility to collect information about landslide and GLOF occurrences via internet search (e.g. Google Alerts), but otherwise, we plan to use already established methods for data acquisition.

New methodologies for data analysis?

Regarding the glacial lake hazard assessment we are planning to develop new methodology based on complex evaluation of all involved processes affecting the GLOF hazard, including slope stability/ice avalanche occurrences (frequency, magnitude, triggering factors), detailed characteristics of glacier, glacial lake and its moraine.

Incorporation of new disciplines into your program?

We would like to include social scientists, who will be able to evaluate vulnerability and resilience of local inhabitants to the studied natural hazards.

Expansion to new geographic areas?

We think to enlarge our field research to the region spanning from the glaciated Cordillera Blanca, crossing the Western Cordillera to the Pacific Coast of Peru. Regarding the global GLOF database, we would like to include all relevant high mountain regions of the World.

What other new challenges are you thinking about?

How to communicate our scientific results to local communities in an sustainable way, which needs to be independent of local politics.

Julie Korb

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What are your central research objectives?

Our experiment is the first in the Southern Rockies to test the independent and combined effects of earlier snowmelt and growing season warming. Year round warming experiments melt snow earlier, but do not isolate the effect of earlier snowmelt from temperature. Our main objectives are to: 1) test the independent and combined effects of early snowmelt due to desert dust deposition and growing season warming in an alpine plant community; 2) monitor the timing of plant life history and pollinator life history events to quantify trophic level responses to climate change; 3) determine support for competing theories (stress gradient hypothesis--competition vs. facilitation) on plant community response to climate change.

On what do you take data?

Microclimate, plant phenology, pollinators, plant species composition and abundance, nutrients .

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

Alpine plant community and trophic level responses to earlier snowmelt and growing season warming. Specifically, is the alpine at risk of floristic homogenization, how fast will plant composition change and which species (alpine specialists or generalists) will increase or decrease that may alter ecosystem function such as plant-pollinator interactions, nutrient cycling and snowpack duration and runoff intensity and timing?

What is the geographic scope of your research?

Subalpine and alpine environments in the western US.

Where do you gather data?

San Juan Mountains, southwestern Colorado, USA.

Over what geographic domain do your conclusions hold?

Southern Rocky Mountains, USA but general research findings related to species' interactions and theory can be applied and tested in geographically diverse alpine environments.

What agencies and foundations fund your research?

Bureau of Land Management, Mountain Studies Institute, SEEDS-Ecological Society of America, Foundation Grants.

What kinds of resources will your funding support?

Undergraduate research interns, field supplies, travel costs.

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

The goal of our research is to create a long-term study site in the San Juan Mountains in cooperation with regional non-profits and federal land management agencies. The San Juan Mountains are severely understudied due to the geographic locality of the mountain range not being near any large federal research station or R1 university.

New methodologies for data acquisition?

We would like to incorporate additional manipulations to the study (e.g., plant removal) to test current theories in plant community ecology such as the stress-gradient hypothesis to gain a better understand of how species' interactions influence individual species' responses to changes in climate.

New methodologies for data analysis?

Multivariate data analysis and mathematical models.

Incorporation of new disciplines into your program?

This year we just added plant-pollinator interactions and nutrient cycling. We would also like to include more below-ground research investigating the long-term effects on soil ecology.

Expansion to new geographic areas?

Currently we only have one study site in the San Juan Mountains and we hope to expand our research to numerous sites within the San Juan Mountain region.

What other new challenges are you thinking about?

The biggest challenge for our research project is securing long-term funding. We are submitting a grant as a pre-proposal in January 2013 to the National Science Foundation () Division of Environmental Biology, Population and Community Ecology cluster to start addressing this issue.

Christian Mavris

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What are your central research objectives?

Minerals are remarkable tools to understand the past climate conditions, therefore can be useful tools to predict possible evolutional scenarios for the landscape.

On what do you take data?

Soil, bedrock, stream water, rain water, plant leaves.

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

Minerals are an archive of information. Weathering promotes the degradation of the crystal lattice, thus chemical elements are released and become nutrients for plant and microbial communities.

What is the geographic scope of your research?

Cryic, high Alpine environment.

Geographic scope: Where do you gather data?

Morteratsch proglacial area (SE Switzerland), Wind River Range (Wyoming, USA).

Over what geographic domain do your conclusions hold?

High Alpine environment, crying environment, quickly deglaciating areas.

What agencies and foundations fund your research?

Swiss National Foundation For Science (SNFS).

What are the time horizons for your funding?

1 year.

What kinds of resources will your funding support?

Field work, analytical measurements.

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

My dream is to become curator of a mineralogical museum, with a strong focus on environmental mineralogy. The main research goal is the formation of a dense network of skilled international scientists focusing on different aspects of mineral weathering, at all possible levels (cations, ions, isotopes, structural features, phase transformations). This would obviously involve new case studies in different environments (i.e. mine tailings, polluted areas, urban case studies, etc.).

Among them, the combination of dendrochronology as a link to detect mineral weathering and chemical fluxes in the critical zone.

New methodologies for data acquisition?

Permanent data loggers and field data samplers; frequent autosampling during batch experiments (in lab)

New methodologies for data analysis?

Investigation of trace elements in plant tissues. Use of multiple isotopic tracers for understanding the influence of individual mineral dissolution in the life cycle, and its fate in the food chain.

Incorporation of new disciplines into your program?

Dendrochronology, plant biology, toxicology.

Expansion to new geographic areas?

Southern Europe, Australia, China, Norway.

What other new challenges are you thinking about?

Creating interdisciplinary interest for environmental mineralogy.

Bill McConnell

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What are your central research objectives?

Interdisciplinary investigation of coupled human and natural systems, primarily concerning landscapes in which resource dependent communities coexist with endangered wildlife, with particular emphasis on collaborative approaches.

On what do you take data?

Land cover dynamics, and associated human land use and wildlife habitat selection.

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

Reciprocal interactions between land use and habitat selection, as conditioned by policies aimed at conservation and development.

What is the geographic scope of your research?

In and around protected areas in Madagascar, China and Nepal.

Geographic scope: Where do you gather data?

In and around protected areas in Madagascar, China and Nepal.

Over what geographic domain do your conclusions hold?

Landscapes in which resource dependent communities coexist with endangered wildlife.

What agencies and foundations fund your research?

US NSF, NASA, NICHD.

What kinds of resources will your funding support?

Support for graduate students and postdocs, and logistical support for research.

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

Test the lessons learned and methodologies developed at other sites.

New methodologies for data acquisition?

Accessible/appropriate technology for collaborative mapping.

New methodologies for data analysis?

Accessible/appropriate technology for collaborative geographic analysis.

Incorporation of new disciplines into your program?

Recently begun to engage with other social sciences, both quantitative (e.g., cognitive science) and qualitative (e.g., animal studies, criminal justice) as well as humanities (e.g., philosophy).

Expansion to new geographic areas?

Always interested.

What other new challenges are you thinking about?

Too numerous to mention…

Irena Mrak

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What are your central research objectives?

Main research focus is sustainable development of mountaineering as a form of mountain tourism in the Worlds high mountain areas. The main points of interest are environmental impacts of mountaineering in the high mountain areas (defined as areas with no permanent settlements) and social, cultural and economic impacts in the nearby populated mountain areas.

On what do you take data?

The research is based on environmental characteristics of a particular high mountain area (such as – relief, water resources, climate...), and on the other hand on the data about the number of visitors in the high mountain areas (number of expeditions, number of trekkers); official socio-economic data about the particular mountain areas; data/information gained through in-depth interviews with stakeholders involved in mountaineering development.

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

The main goal is to define the environmental carrying capacity of high mountain areas related to mountaineering and social carrying capacity of the nearby mountain areas from where usually come the stakeholders which are directly involved into the mountaineering development as a form of economic activity.

What is the geographic scope of your research?

High mountain areas – geographically defined as areas with high relief energy, steep slopes, glacial relief, mountain climate and with only occasional presence of humans (all major mountain ranges in the World, particularly Karakorum).

Geographic scope: Where do you gather data?

Field work in the research area, statistical data sources.

Over what geographic domain do your conclusions hold?

The research results at present are deriving from the study in the example area of Karakorum and will be in the future compared with high mountain areas of the Himalaya and other World high mountain areas in order to define a basic model of sustainable development of mountaineering.

What agencies and foundations fund your research?

None – the research is based on personal funds.

What kinds of resources will your funding support?

I cover all the costs of the research.

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

The idea is to continue working in the Karakorum but also in other high mountain areas. The work in Central Karakorum National Park will be partially covered by a PhD candidate from the Karakorum University whose thesis is focused in the sustainable tourism development in the national park.
Regarding the funding, the plan is to find an appropriate call for similar projects and submit a project application.

Incorporation of new disciplines into your program?

The economic perspective of mountaineering related to local communities and their welfare is something I would like to include in the future research.

Expansion to new geographic areas?

As already mentioned – the idea is to extend the research to all major World mountain areas.

What other new challenges are you thinking about?

In the future I intend to focus on the natural hazards in mountain areas, related to spatial planning and regional development of mountain areas.

Marc Muller

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What are your central research objectives?

„My PhD focuses on in-line hydropower (i.e. the inclusion of micro hydropower generation in gravity fed water supply networks) and the evaluation of its potential in developing countries, and in the Nepalese Himalayas in particular. Since field data are generally scarce in the regions of interest, my general objective is to develop and validate methodologies to use remote sensing data and GIS to assess water supply and micro hydropower potential from both the supply ((i.e. hydrology, elevation, infrastructure provision costs) and demand (i.e. community consumption and willingness to pay) sides.
My current focus is to generate flow duration curves at un-gauged rivers based on remotely sensed precipitation, land cover and elevation data. In a first phase the ability of remotely sensed precipitation to adequately represent the distribution of local daily rainfall was assessed and the appropriate bias-correction and downscaling procedures validated.“

On what do you take data?

I am using data on average daily river discharge, daily precipitation, daily minimum and maximum temperature, elevation, land cover and soil.

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

I am attempting to predict:
1. The rainfall occurrence probabilities and rainfall intensity distribution on a 6km x 6km resolution grid covering the whole country of Nepal using remote sensing precipitation data.
2. (Using these results) flow duration curves of ungauged streams in Nepal at a resolution of ~40km2 watersheds.

What is the geographic scope of your research?

The geographic scope of my research is on the three principal basins of Nepal (Sun Koshi, Narayani and Karnali), which cover the whole country and small sections of the Tibetan plateau.

Geographic scope: Where do you gather data?

In addition to the global remote sensing data, I am using river discharge data (50 stations), and precipitation/temperature data (219 stations) collected by the Nepalese government across the considered region.

Over what geographic domain do your conclusions hold?

My conclusions hold for the central Himalayas and the hilly regions of the himalayan foothills. The methodologies however are based on globally available data with the explicit purpose of being applicable globally with minor adaptations.

What agencies and foundations fund your research?

I am currently a Fulbright Science and Technology Fellow funded by the US department of State.

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

With flow duration curves reliably generated from remote sensing data, I would like to optimize and validate their use for rural water infrastructure planning in developing countries.
In addition to field data scarcity, developing countries are characterized by the absence of connexion to a large scale electricity grid in most communities. This has significant impact on the feasibility of micro-hydropower generation on both the supply side (i.e. power houses should be within mini-grid distance of a community) and demand side (whatever is generated must be locally consumed).
My plans are to develop methodologies that integrate these aspects and reliably use the remote-sensing derived flow duration curves in a practically efficient way for rural water infrastructure planning.

New methodologies for data analysis?

I will use remote-sensing derived flow duration curves as inputs to a GIS model that optimizes the capacity and layout of micro-hydropower infrastructure and estimates their supply curve across the region of interest. The new methodology will account for infrastructure access by using population density as an input. Again, an explicit constraint will be to only use globally (e.g. Global population density grid) or aggregated (e.g. unit costs) data.

Incorporation of new disciplines into your program?

As mentioned above, local demand is a key feasibility parameter in developing countries. I am interested in investigating how community demand curves for electricity are related to their remoteness.
This relation makes intuitively sense as the availability of appliances and the ability to bring production surplus to the market arguably decrease with remoteness.
Remoteness being a geographic parameter, such a relation would enable to predict electricity consumption and willingness to pay based on community location. This will allow to better estimate infrastructure feasibility at an early stage and improve rural water infrastructure planning.

Expansion to new geographic areas?

After developing methodologies for the Nepalese Himalayas, I would like to adapt them / validate them in other major mountainous developing regions like the Rwenzories or the northern Andes, where in-line hydropower is potentially applicable.

What other new challenges are you thinking about?

Estimating demand curves poses econometrically challenging identification problems. One needs an instrumental variable that affects consumption, but only through its effect on price through supply. In other words such a variable should affect supply while not directly affecting demand. In developing countries quantiles from the flow duration curves are very promising candidates as they definitely affect electricity production while arguably not affecting electricity consumption.
The non-availability of discharge data at sites were electricity demand data were collected has until now prevented such an approach. But the availability of flow duration curves at ungauged sites using remote sensing data will provide some promising new opportunities.

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What are your central research objectives?

Future climate change assessment with focus on changes in precipitation and temperature extremes using global and regional climate models. Assessing the performance of a regional climate model in dynamic downscaling of seasonal forecasts, with emphasis on the impact of soil moisture initialization on the forecast skill.

On what do you take data?

I use the results of global and regional climate models simulations that contain upper-air and surface meteorological parameters.

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

Future climate changes.

What is the geographic scope of your research?

Europe, Mediterranean region and Croatia.

Geographic scope: Where do you gather data?

Results of global model simulations produced within the phase 3 of the Coupled Model Intercomparison Project (CMIP3) were retrieved from the Program for Climate Model Diagnosis and Intercomparison (PCMDI) database. Regional climate model simulations are performed at Meteorological and Hydrological Service of Croatia.

Over what geographic domain do your conclusions hold?

Europe and Mediterranean Basin.

What agencies and foundations fund your research?

Croatian government, Croatian Ministry of Science, Education and Sports, and European Union Framework Programme 7.

What are the time horizons of your funding?

2-4 years per project

What kinds of resources will your funding support?

Funding supports researchers on the project, technical equipment, publications, scientific meetings, educational activities, seminars.

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

Assessment of future climate change over Croatia under new reference concentration pathways (RCPs) of the greenhouse-gasses concentrations.

New methodologies for data acquisition?

Global models‘ simulations produced within Coupled Model Intercomparison Project phase 5 (CMIP5) and regional models‘ simulations produced within Coordinated Regional climate Downscaling Experiment (CORDEX).

New methodologies for data analysis?

Using ensembles of global and regional models simulations to assess climate change and uncertainty related to future climate projections.

Expansion to new geographic areas?

Focusing on climate changes in the mountainous regions in Croatia.

What other new challenges are you thinking about?

Transferring climate change information into a form suitable for potential users in different fields e.g. tourism, energy sectors such as hydropower.

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What are your central research objectives?

Study the continuous Climate-Glacier interaction over the period of time in Himalayas.
Apply Climate Models.
Utilization of Latest available Remote Sensing Datasets.

On what do you take data?

Weekly based data is available mostly and useful for applying Climate Models.

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

First want to predict the Climate change over the period of time. Then study the physical changes in the Glaciers. Then compare these two and study the interaction between these two processes.

What is the geographic scope of your research?

Himalayan Glacier Region.

Geographic scope: Where do you gather data?

Field data collection, AWS, Meteorology Dept. Data, DGPS and Satellite Imagery.

Over what geographic domain do your conclusions hold?

Regional level.

What agencies and foundations fund your research?

Department of Science and Technology, Govt. of India.

What kinds of resources will your funding support?

Continuous Monitoring Instruments, Field Survey, AWS, DGPS and Satellite Imagery.

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

Availability of continuous data is the major issue for the hilly and in-accessible terrains like Himalaya. As development of the Remote Sensing datasets has made this task easy and provide necessary accuracy of the data. So, continuing the same study will lead to have more accurate and predicted databases for next 5-10 years.

New methodologies for data acquisition?

Remote Sensing based datasets and AWS datasets on real time based collection.

New methodologies for data analysis?

Develop new Projection Models to get more accurate and filtered datasets to make analysis with large number of datasets.

Incorporation of new disciplines into your program?

Experiment with new different Climate Models available to make suitable model output.

Expansion to new geographic areas?

Earlier worked with Indian Himalaya, but decided to work on entire Himalaya on Regional scale based. Want to compare the behavior of these Himalayan Glaciers with Arctic Region Glaciers with various pattern of Climate Change.

What other new challenges are you thinking about?

As many new remote sensing datasets are coming up, challenge is to analyze accuracies of these datasets in different scales to compare with the existing datasets prepared based on different datasets.

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What are your central research objectives?

Mountain weather and climate variability in Tibet, Himalayas and Japan Alps areas.

On what do you take data?

Precipitation system and land-atmosphere interaction

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

Climate change, occurrence of extreme events, water resources.

What is the geographic scope of your research?

Tibet, Himalayas and Japan Alps areas under Asian monsoon climate.

Geographic scope: Where do you gather data?

Establishment of home page
E.g. http://www.geoenv.tsukuba.ac.jp/~jalps-atm/index.html

Over what geographic domain do your conclusions hold?

Asia.

What agencies and foundations fund your research?

CEOP-AEGIS funded by EU-FP7 and JALPS funded by MEXT-Japan

What are the time horizons for your funding?

1-2 years.

What kinds of resources will your funding support?

Research project (?).

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

I would like to chain the JALPS domestic- project to activate as an international flame work.

New methodologies for data acquisition?

Constriction of simple laser drop-sizing gauge that works in remote areas to discriminate rain vs snow.

New methodologies for data analysis?

Coupling of regional weather model output with multiple layer snow cover model output.

Incorporation of new disciplines into your program?

Expansion of know-how of CEOP-AEGIS international project into JALPS project.

Expansion to new geographic areas?

Application of pilot study in Japan to Tibet/Himalaya areas.

What other new challenges are you thinking about?

New satellite program to observe global precipitation, such as TRMM-follow on GPM mission, would strongly contribute for water resources and climate change researches in mid-latitude mountain areas.

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What are your central research objectives?

The overarching objective of my research is to understand how global changes in climate and land use affect the biosphere-atmosphere mass and energy exchange and how these exchange processes feedback to climate development.

On what do you take data?

I am quantifying and simulating the ecosystem-atmosphere exchange of energy and trace gases such as CO2, CH4, N2O, O3, volatile organic compounds, gaseous elemental mercury and many more.

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

The quantity of material and energy exchanged between ecosystems and the atmosphere and how this exchange responds to environmental forcings and land use.

What is the geographic scope of your research?

Temperate mountain ecosystems.

Geographic scope: Where do you gather data?

Mainly the Alps.

Over what geographic domain do your conclusions hold?

At least the temperate mountain regions of Europe.

What agencies and foundations fund your research?

Mainly: EU, the Austrian National Science Fund, South Tyrolean Science Fund, Tyrolean Science Fund, Austrian Ministry of Science and Education.

What are the time horizons for your funding?

1-3 years

What kinds of resources will your funding support?

Mostly salary for project staff and myself (partly), consumables, travel, a little bit of research infrastructure.

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

Better merge experimental and modeling research lines into a unified framework. Use a research approach that integrates over terrestrial and aquatic ecosystems. Get the bigger picture by looking at multiple ecosystem services at the same time.

New methodologies for data acquisition?

New methods for quantifying biosphere-atmosphere exchange processes in complex terrain typical for mountain landscapes.

New methodologies for data analysis?

See above - these new measurement methodologies will also require new analysis methods, actually we need a combination of both.

Incorporation of new disciplines into your program?

Boundary-layer meteorology, microbiology, atmospheric chemistry, aquatic ecology.

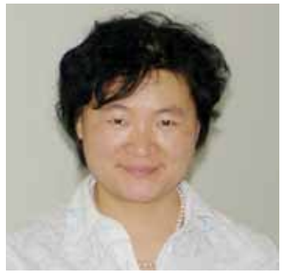
Expansion to new geographic areas?

Not sure – there is still a lot do in the Alps.

What other new challenges are you thinking about?

Combining curiosity-driven research with questions that matter for society in research projects that are fun to do.

Qinghua Ye



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What are your central research objectives?

My central research objectives is based on interdisciplinary and integrated research on theories and methodologies in observing changes of land cover (including glaciers, lakes, wetlands, etc.) on terrestrial surface, 1) to find out the objective changing facts and rules of those sensitive indicators in the global climate change at multi-sphere in the Earth System Science from multi-sensors at different spatial– temporal scales, 2) to predict the future of our living world.

On what do you take data?

I take data on phenomena includes Glacier, Lake, Lake Ice, wetlands, etc., all of which belong to one kind of the Land Cover on the earth surface. What's more, as glacier melt water flows into nearby lakes, glacier volume and lake depth changes are also very important data for us in research. Glacier, lake and wetlands change are characterized based on times series of data.

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

Using those data, we are trying to monitor the land surface changes and to predict the future of lakes, glaciers, and land surface changes on the Tibetan Plateau.

What is the geographic scope of your research?

The Tibetan Plateau and its surroundings

Geographic scope: Where do you gather data?

Data are acquired by an integrative multi-disciplinary approach, which couples multi-sensor remote sensing data with in-situ measurements on the Tibetan Plateau. Satellite data mainly comes from internet data center by NSIDC, USGS, JAXA, ESA, etc. Seven comprehensive stations have been set up by our institute of Tibetan Plateau Research of CAS since 2005, which are collecting in-situ data all day and all nights at different geographical zones on Tibet.

Over what geographic domain do your conclusions hold?

On Global Climate change, also its impacts on the Tibetan Plateau and its surroundings.

What agencies and foundations fund your research?

Projects from the National Natural Science Foundation of China (NSFC), the National Basic Research program of China from Ministry of Science and Technology of the People's Republic of China, and the Knowledge Innovation Foundation Program for outstanding Young Scholar from Chinese Academy of Sciences (CAS) are the major foundations for my research.

What kinds of resources will your funding support?

It provides financial support for our research.

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

Since most of the climate change studies by modeling or satellite observations nowadays are usually carried out by different groups separately, lots of important linkages are missed in the whole story due to shortage of interdisciplinary and trans-disciplinary studies. In the next 5-10 years it needs us to have multi-disciplinary scientists together in interdisciplinary researches on global climate change at multi-spheres using multi-integrative approaches.

New methodologies for data acquisition?

Data acquisition needs both from higher spatial-temporal resolution of tandem satellite sensors system for vulnerable or sensitive indicators monitoring in requirements, and for data calibration and validation by remote observations at multi-platforms for climate model improvement in prediction by correcting imperfections and reducing uncertainties to the utmost, etc.

New methodologies for data analysis?

Multi-integrative approaches and comprehensive methodologies are necessity for data analysis now.

Incorporation of new disciplines into your program?

It is time to work with multi cooperations.

Expansion to new geographic areas?

Widen our research geographic area, Continental or globally research scope could help us understand what is happening in the world nowadays.

What other new challenges are you thinking about?

It is challenging our innovative abilities not only with wide scope of experience, skills and acquiring new knowledge, but also the integrated research ability for multi cooperations by scientists in related fields.

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