

Assessing Climatic Change and Societal Impacts in the American Cordillera (ACCORD)

Asesorio del Cambio Climático y de sus Impactos en la Cordillera Americana (CIMA)

A Framework For a Proposed IAI Initiative



ACCORD/CIMA Initiative Members

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Assessing Climatic Change and Societal Impacts in the American Cordillera (ACCORD)

Major Purpose

To implement broadly-based climate expertise and information transfer focused geographically on the American Cordillera, in order to develop effective climate change adaptation strategies in the region

CIRMOUNT

Consortium for Integrated Climate Research in Western Mountains



Anticipating Challenges to Western Mountain Ecosystems and Resources

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The Consortium for Integrated Climate Research in Western Mountains (CIRMOUNT) is a collaborative, interdisciplinary consortium dedicated to understanding climates and ecosystems of western North American mountains. CIRMOUNT's goal is to bring together researchers from diverse disciplines and institutions to measure and understand climate-driven changes in the unique landscapes that define western North American mountains, and to respond to the needs and challenges of western society for mountain resources imposed by climate change. CIRMOUNT is sponsored by a diverse group of agencies, universities, and institutions, and is endorsed as a pilot project of the International Mountain Research Initiative.

Read more in CIRMOUNT's publication, [Mapping New Terrain: Climate Change and the America's West](#).

CIRMOUNT produces a newsletter, [Mountain Views](#). The August 2008 edition is available now.

Our colleagues at Mountain Research Initiative (MRI) in Switzerland have published their first newsletter. It includes an article about CIRMOUNT. See the link to the MRI newsletter in the What's New box to the right. [MRI Newsletter Launch Announcement](#)



Highlight

- The [Climate, Ecosystems and Resources of Eastern California](#) conference (CEREC) to be held in Bishop, CA, Nov 5-8, 2008. [Conference announcement to print and post](#)

What's New

- The first edition of the [Mountain Research Initiative Newsletter](#) is now available.
- CIRMOUNT will sponsor a session at the Fall AGU Conference in San Francisco December 15-19, 2008. [More information](#)
- Play it again! [MTNCLIM2008 website](#) has conference video, PDFs of presentations, and news articles.

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<http://www.fs.fed.us/psw/cirmount/>

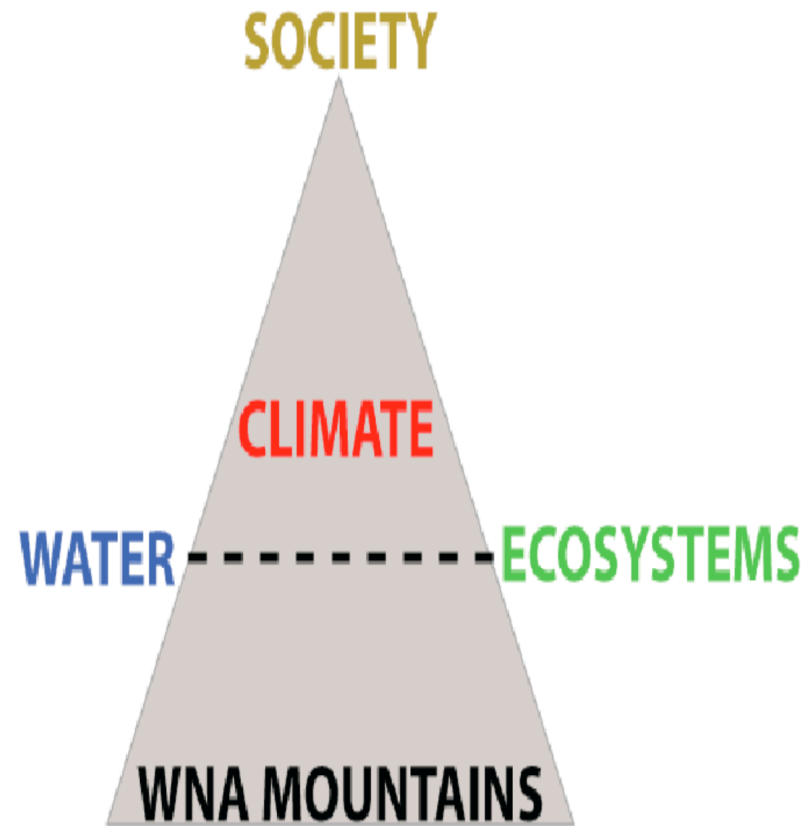


Figure 1. Key scope and foci of CIRMOUNT (WNA is western North America).

<http://www.fs.fed.us/psw/cirmount/>

Mapping New Terrain Climate Change and America's West



Anticipating Challenges to Western Mountain Ecosystems and Resources

The Consortium for Integrated Climate Research in
Western Mountains
(CIRMOUNT)

July 2006

Co-Chairs

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Malcolm K. Hughes, University of Arizona, Laboratory of Tree-Ring Research, Tucson,
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David L. Peterson, USDA Forest Service, Pacific Northwest Research Station,
Seattle, WA USA

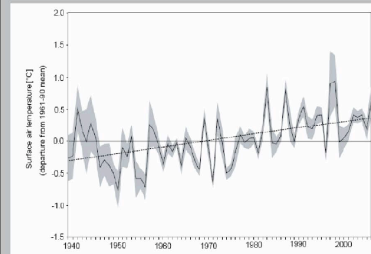
Kelly T. Redmond, Desert Research Institute, Western Regional Climate Center, Reno,
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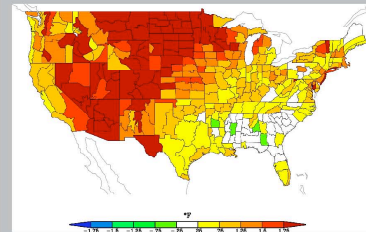
Connie Woodhouse, NOAA, Paleoclimatology Branch, Boulder, CO USA (now at the
University of Arizona)

Box 2. Desvíos de temperaturas anuales, 1939-2006, con referencia al promedio de 1961-1990 en los Andes tropicales (1° N-23° S). Serie basada en registros de 279 estaciones. El aumento de temperatura en la Cordillera es -0.7°C .



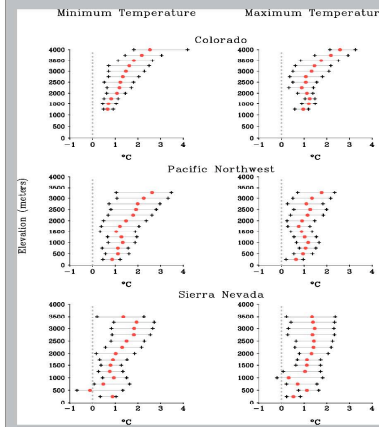
Annual temperature anomalies, 1939-2006, relative to 1961-1990 averages in the tropical Andes (1° N-23° S). Time series based on records from 279 stations. The increase in temperature in the Cordillera is about 0.7°C

Box 3. Observed Annual Temperature Anomaly 2000-2006. Notice much greater warming in the mountainous Western U.S.A.

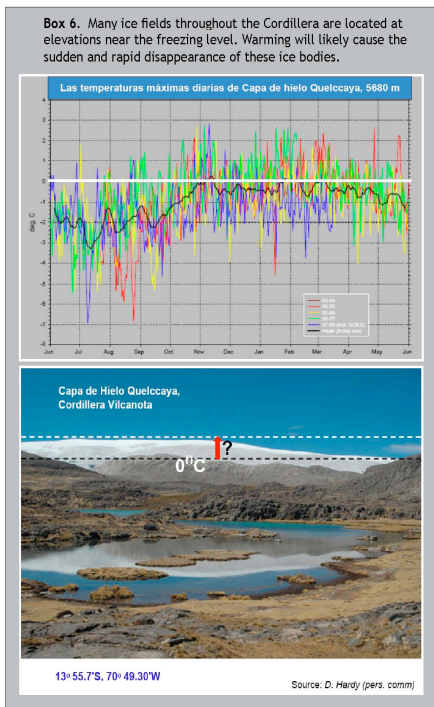


Source: NOAA Earth System Research Laboratory. Reference Period: 1950-1999

Box 4. Post-1980 Observed Temperature Trends vs Station Elevation for Western USA. From Diaz and Eischeid 2007



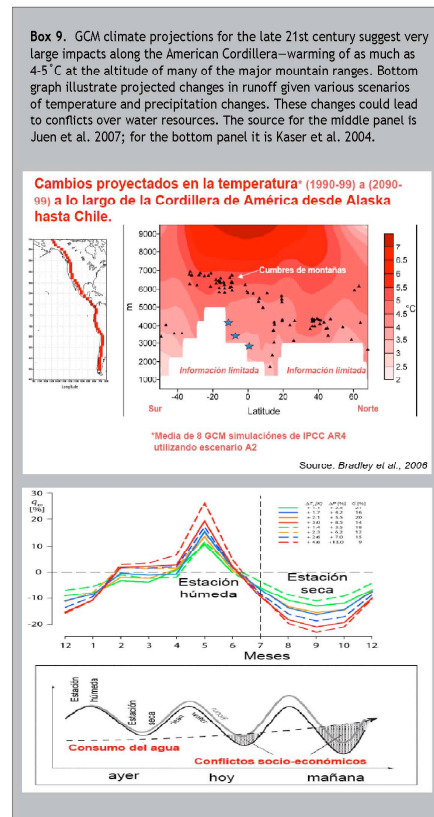
Persistent drought presents the countries that are part of the American Cordillera with some of their greatest challenges. Hydrological changes resulting from changes in precipitation, temperature and snow cover will impact a broad range of socioeconomic sectors ranging from hydropower generation, ecosystem health, water resources for irrigation and civil supply to tourism-related industries, such as skiing (Bradley et al. 2006; IPCC 2007b). This document advances a framework for an integrated climate science and human dimensions program initiative to be developed by the IAI. We present some examples of ongoing research and outreach activities that could serve as models for IAI-supported activities in this area. The proposed areas for future integrated climate assessment work are illustrative of activities to be highlighted in a formal call for proposals.



Research (IAI) is an intergovernmental organization supported by 19 countries in the Americas that is "dedicated to pursuing the principles of scientific excellence, international cooperation, and the full and open exchange of scientific information to increase the understanding of global change phenomena and their socio-economic implications." Recognizing the need to better understand the natural and social processes, which drive large-scale environmental change, the IAI supports a broad range of programs that include exchanges between scientists and policy makers. A key goal of the IAI is to augment the scientific capacity of the region and to provide information in a useful and timely manner to policy makers. Its primary objective is "to encourage research beyond the scope of national programs by advancing

comparative and focused studies based on scientific issues important to the region as a whole." Its stated mission is to develop the capacity for understanding the integrated impact of present and future global change on regional and continental environments in the Americas and to promote collaborative research and informed action at all levels.

The western cordillera of the Americas forms a unique transect that intersects the major features of the global atmospheric circulation and flank its largest ocean. The following are some key questions regarding the nature and impact of ongoing and future global warming in mountain regions of the American Cordillera (see schematic diagram, Box 7).



recent efforts in this direction are encouraging (Rauscher et al. 2008; Karmalkar et al. 2008; Urrutia and Vuille 2008, and others).

Role of Land Cover Changes in Climate Change

Changes in the alpine cryosphere may represent some of the earliest signs of large-scale climate change. A reduction in the area covered by snow and ice not only serves as an indicator of change but also provides powerful feedbacks through changes in albedo. In addition, melting of permafrost destabilizes slopes in areas of high relief, leading to landslides, rockfalls and other climate-impacted geomorphic hazards, such as the formation of proglacial lakes, which can easily breach leading to potentially catastrophic flooding and other significant hazard in many places in the Andes. Decision support tools that could be used to better understand what is happening in the region include so-called integrated assessment models that consider an ensemble of physical, socioeconomic, and other inputs relevant to mountain environments.

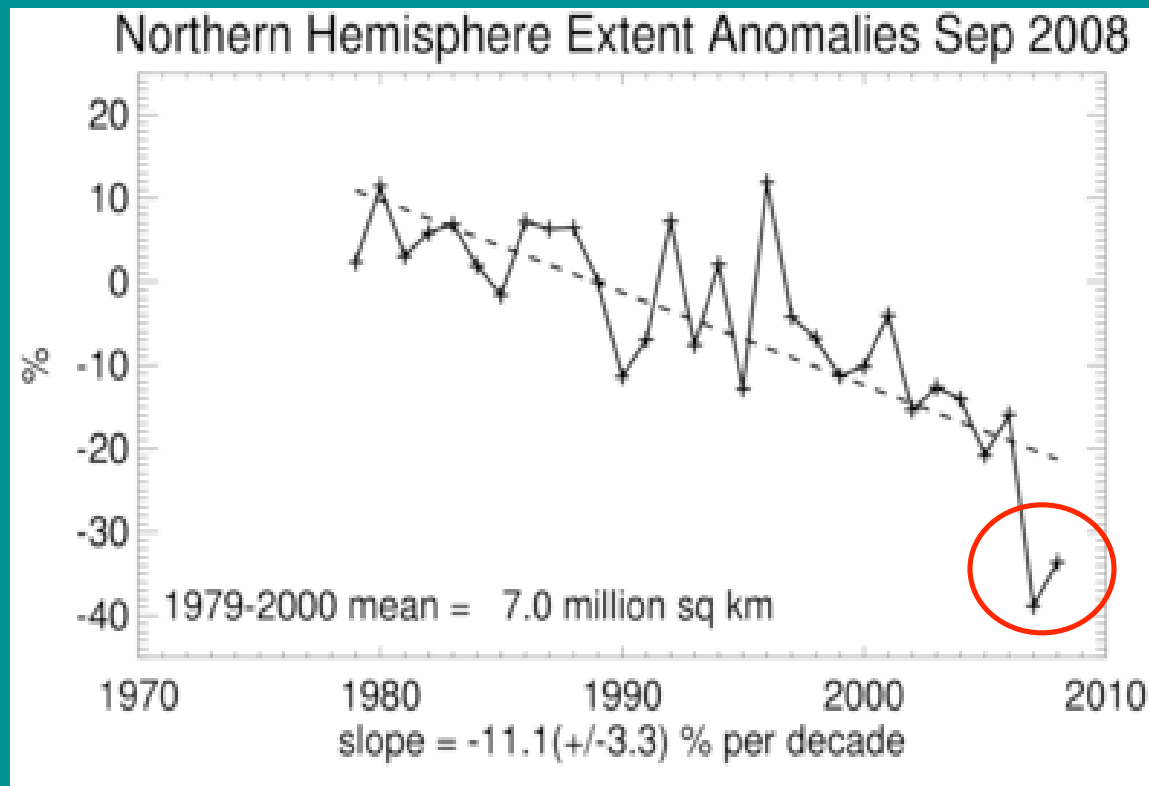
Satellite images and airborne repeat photography of the margins of glaciers in the Cordillera region presented at the symposium demonstrate the significant changes in the extents of glaciers that have occurred in the past century (see Box 5). These changes are having, and will have, profound consequences for societies in the region that have depended on water from these previously glaciated catchments for their livelihood and culture. The characterization of land surface changes on regional to continental scales is becoming

increasingly important in assessing the impacts of climate change in relation to direct human modification. Changes in biogeochemical cycles are linked to changes in climate, the water cycle, land use patterns both rural and urban, and changing vegetation types (Ray et al. 2006). Such changes could have adverse impacts on agricultural production, unmanaged systems, and aquatic systems receiving runoff.

Avoiding or mitigating these adverse impacts requires a fundamental understanding of linkages within

Focus on Improved High-Resolution Climate Modeling

Detailed projections of climate change in the American Cordillera are severely hampered by the very fact of its complex topography. Regional climate models embedded in coupled ocean-atmosphere models and connected to hydrological & glaciological models—and ultimately to ecological models are needed to provide decision makers with the tools for effective climate policy making. Some

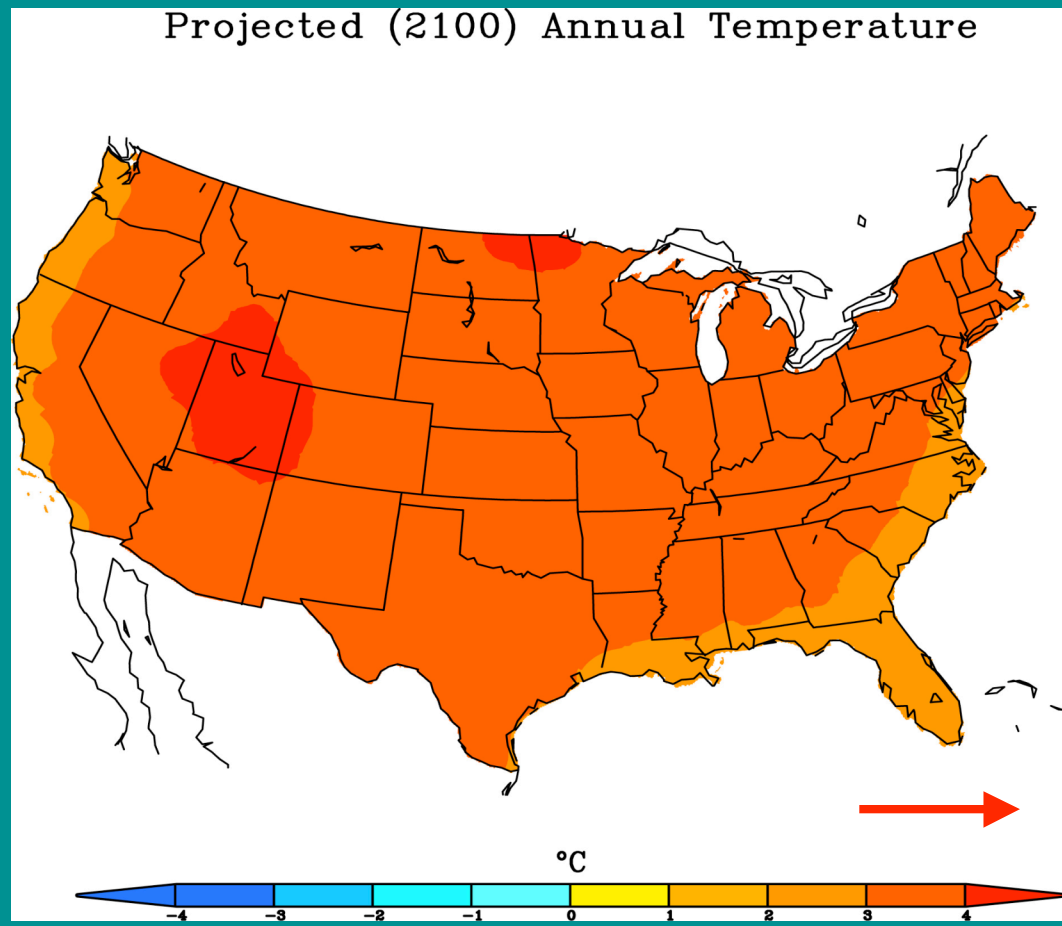


System does not recover

Implications: Faster sea-level rise than anticipated just a few years ago on account of warmer oceans and faster ice-melt from Greenland.

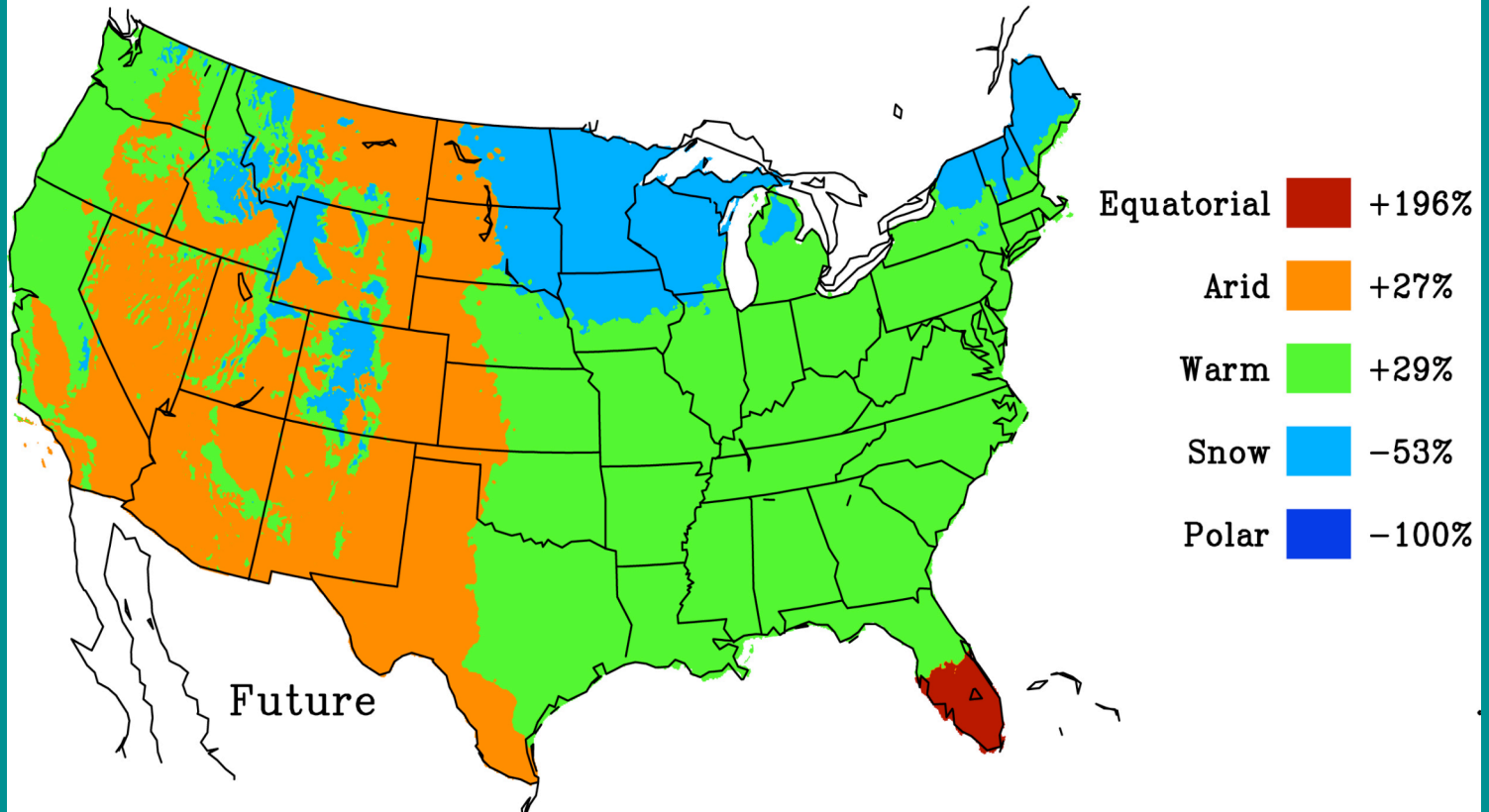
Projected Western US Warming +4°C by 2100

For every 0.5°C warming, montane tree lines advance ~300 feet



> 3°C/5°F

Köppen-Geiger Climate Classification



Climate Classification Based on Late
21st Century Climate Values

Key Initiative Actions

- **Develop protocols and activities to enhance the use of climate variability and change information in the region through development of decision support tools**
- **Establish collaborative relationships with representative communities of stakeholders and decision makers in collaboration with local information brokers**

Key Activities (cont.)

Focus on sustainability aspects of systems under a changing climate related to

- Water resources**
- Ecosystem health**
 - Public health**
- Other climate-sensitive systems (e.g., agriculture)**

Actors include public agency representatives, NGO's, quasi-governmental institutions, universities, etc.

Fostering Scientist-Stakeholder Collaboration


- **Identify focusing questions**
- **List the major external drivers related to climatic variability and change**
- **Develop appropriate conceptual models--what are the key processes, and assess potential impacts on resources**
 - **Estimate effects on “operations”**

Conceptual Program Elements



Climate research activities—Goal is to increase understanding of climate mechanisms

Advocate for maintaining the adequacy of climate monitoring system to provide necessary baseline observations, applications and decision support



Climate Science Applications—Goal is to develop appropriate understanding and the analysis tools for real world problem-solving and decision support

Potential Synergistic Activities & Programs

Interest by Spanish and Portuguese universities in enhancing climate research activities with Latin American research groups

<http://ft2dc.uvigo.es/workshop/Memoria%20Workshop.pdf>

Partner with existing organizations such as the Mountain Research Initiative in Bern Switzerland to foster research collaboration in the Americas that is focused on mountain climate change and adaptation issues

DOS COMUNIDADES (España/Portugal—Iberoamérica) CON INTERESES COMUNES

Existen ámbitos comunes de trabajo para
avanzar la colaboración con meta de
ampliar el conocimiento mejor del clima
Iberoamericano y mejorar los *expertises*
de los grupos

<http://ft2dc.uvigo.es/workshop/Memoria%20Workshop.pdf>

COOPERACIÓN EN INVESTIGACIÓN

- A) Poza cálida del Atlántico y sistemas de jets asociados → IASCLIP (previsto UE FP7)
- B) Modelización regional y global. Aplicación de métodos objetivos de caracterización de transientes y bloqueos. Evaluación de los modelos de circulación general en la región. → Red CYTED

COOPERACIÓN ACADÉMICA

- Próximo encuentro se realizará en una escuela a celebrar en 2010 (curso monográfico)
- Postgrado en Ciencias del Clima

PARTICIPACIÓN EN EL IPCC

- Mayor énfasis regional en Iberoamérica
- Apoyo de estudios regionales incluyendo infraestructura observacional y técnica de monitoreo, y análisis
- Fomento para apoyar la participación en grupos de trabajo



The American Cordillera Transect for Global Change Research
English version

Dear Colleagues

Many thanks to those of you who have contributed to this Newsflash!

The aim of the flash items is to attract the readers' interest and to give links to further information: send max. 500 char. (incl. spaces), start with your name, institution, group, email address. State what you want to tell the reader, e.g., do you want to tell us about the existence of your group? Are you describing your current projects? Are you looking for collaborators? If you want to distribute articles do NOT send us the pdf file, but rather a link to display the document on your website.

Deadline for submissions to the next flash: October 28th, 2008

Send your information to fsarmien@uga.edu cc to drexler@giub.unibe.ch

Juan A. González from the Miguel Lillo Foundation –Institute of Ecology– in Tucuman, reports on the project to rescue *Chenopodium quinoa* (“quinoa”) as a productive and alimentary alternative for high and medium elevation communities in the Argentinean northwest. Because of its high resistance to water stress it can develop in marginal areas. The plant also has a high capacity for photosynthetic assimilation (max 30-32 mmol/m²/seg), and can thus become an excellent regional plant for Carbon sequestration as alternative crop for mountain areas. Our interest is a contact with interested colleagues for distant collaboration and with funding sources in order to deepen our study of Quinoa. lirios@cgcet.org.ar

Jair Ramirez, Ingeominas, Colombia, wants to share with the reader the results from the VII meeting of the Latin American ice and snow working group of PHI-UNESCO. The meeting took place at Manizales, Colombia from 26 to 30 August of this year.

<http://hielosynieves.atwebpages.com/page3.html>



Things we can do now—with a bit of funding

- **Prototype Workshop**

Climate Change Impacts in Northern Argentina—Understanding the risks, possible regional future climate scenarios, and promote discussion of adaptation options

Stakeholders and Sponsors

Argentina legislature committee, Mendoza wine producers, energy sector representatives

How do we get from here to there?

NSF support, Member Country Contribution,
Foundation Grant, GEF Grant, USAID, World
Bank/IDB Project, EU Programs, Bilateral
Agreements

Convening Initial Scoping Workshop