Proposal to the LDEO Climate Center for a Mini-Conference in Spring 2012

Glacier Snowlines and climate change
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Abstract
I propose a 'LDEO Climate Center Mini-Conference' to bring together on campus experts from various disciplines in earth sciences, including glaciology, remote sensing, glacier and climate modeling, glacial geology, geochronology, hydrology and engineering, to review and advance the level of knowledge regarding past and present glacier snowline change and the quantification of past climate variations. Lamont has become a leader in glacier chronology and this conference would further broaden the spectrum of Lamont expertise towards a near-global temperature reconstruction of basic interest to all climate sciences. I expect that many groups on campus and beyond would be interested and involved and that this 2-day conference would form the nucleus of new initiatives and projects cross-cutting the Lamont community. I request partial funding by the LDEO Climate Center and will seek matching funds from the EI and NOAA.

Glaciers, Climate and Chronologies
Glaciers are very sensitive to climate change, which has two major consequences:
1) Glaciers are excellent paleoclimate recorders; and 2) Glaciers are highly vulnerable to ongoing climate change.

Both of these topics will be central to the proposed mini-conference.

Background: Glaciers have been known to be recorders of past climate excursions for the better part of two centuries. The Lamont Cosmogenic Dating Group is leading scientific progress, transformationally refining glacier chronologies around the globe, towards a near-global map of landice-change over the last 70,000 years, including the Holocene period (the last 11,500 years) up to present day.

However, the chronological framework of past and present glacier change on its own cannot deliver all informations needed to transform the glacier record into a detailed climate record. To do so, we need to quantify the amplitudes of glacier change for each dated glacier event. This can be done by reconstructing the snowline altitude (approx. the line dividing the glacier's accumulation and ablation zones) for the past and today, the difference between paleo- and present snowlines yielding the 'snowline-change' for the past glacier event relative to today. This snowline-change is a direct function of the climate change underlying the glacier event. Several different approaches are published to execute the snowline reconstruction in the field, and a wide range of uncertainties are reported. The science underlying a detailed, robust, and precise reconstruction of snowlines and the corresponding errors is a main topic of this mini-conference.

But, what drives glacier fluctuations? Temperature, precipitation, or both, or other parameters? This remains a controversial topic that will be also central to this mini-conference.

Direct glaciological measurements of glaciers synthesized in small-scale, high-resolution glacier models are key to tackle this problem, and I expect to welcome several leading glaciologists to this conference (several have signaled their interest already; see below).

The envisioned near-global temperature map based on the terrestrial glacier record, would manifest a rigorous calibration data set for any climate model. Therefore I expect to host climate modeling experts from NCAR and other groups for this event.

Of particular interest are the implications of this research on modern society problems related to water management. This includes agricultural challenges in view of the task to feed 10 billion people on earth by 2100, energy aspects of hydropower generation, natural hazards related