

Glacial History and Paleoclimate in Patagonia (Southern South America) during the LGM and Termination of the Last Glacial Cycle.

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This report shows some preliminary results of the first field season in Torres del Paine National Park (50°S) in the Chilean Patagonian district. The aim of this project is to reconstruct the timing of the cold events during the last glacial cycle through exposure dating (i.e. ^{10}Be). This approach should provide a valuable glacial chronology of the region, which in turn will be compared with other paleoclimate chronologies in the Southern and Northern Hemispheres. Main questions this project will answer are: a) The initiation, extent, duration, and termination of the Last Glacial Maximum in Patagonia; b) Glacial history during the transition to the present interglacial (i.e. Last Termination); c) The possible existence of interhemispheric asynchrony of past climate change. The results expected from the project will provide a better comprehension about major global problems, such as the origin of the ice ages and the cause of abrupt climate change.

The first fieldwork season occurred during March and April 2007. The areas included in this part were Lago Sarmiento, Lago del Toro, Laguna Azul, and Rio Paine. The first two occupy huge glacial valleys through which main glacier lobes expanded to the east during the Last Glacial Maximum (LGM). Laguna Azul is a smaller glacial valley occupied several times by sub-lobes and Rio Paine valley, located in an up-ice direction, includes the vestiges of the Lateglacial times, before the complete deglaciation of the region. To the east of Sarmiento and del Toro lakes, older and bigger moraine system are very well preserved in the landscape, not visited during this field season.

I developed an extensive mapping on the above-mentioned areas that resulted in the existence of three different moraine complexes, which, following a former nomenclature, I called Stage I, Stage II and Stage III moraine. An older and subtle moraine complex occupy outer areas, beyond the Stage I moraine. While Stage I and II moraines are often separated by a wide (i.e. 0.5 - 1 km) intermorainic depression, Stage III moraine occurs several km in up-ice direction. The mapping at the different

locations permitted to infer, as a preliminary hypothesis, that Stage I-II moraine were deposited during the LGM and Stage III moraine is Lateglacial in age. I conducted an extensive rock sample collection from the different moraine ridges at the four main areas mentioned above (i.e. 70 samples), which should provide precise ages for each of the Stage I-III and pre-Stage I moraines.

The moraine complexes in Torres del Paine normally comprise between 3 - 7 moraine ridges ranging from 2 to 10 meters in height and can be followed by several km, in particular the outermost ridges. In some cases, only boulder lines (i.e. no moraine ridges) of several hundred meters in length define very clear the former glacier limits. Meltwater channels ranging from 5 to 30 meters in width and reaching in occasions several hundreds meters in length outline most of the moraine ridges. The shape, size and surface boulders of the moraines in Torres del Paine are highly variable among pre-Stage I-Stage III systems. Those differences were highly useful to preliminary discriminate the relative ages of them. Pre-Stage I moraines are subtle landforms and only scattered cobbles or boulders occur in their surfaces. Here weathered loess horizons are thicker than the ones topping in any other inner moraine. Whereas Stage I moraine's surface boulders are common, on Stage II-III moraines they are abundant. Loess deposits are virtually absent in the inner (i.e. younger) moraines.

Between 10 and 20 samples might be dated by the end this year (2007) and then a first closer idea of the glacial history in Torres del Paine during LGM and Termination will be obtained. The rock samples lab process is going straightforward and should be done by next October-November for this first group of samples.

Those dates are essential for the next field season to the study area. In addition, there are several locations that weren't visited during the first field activity, such as the moraine belts located beyond the pre-Stage I moraine (i.e. in Patagonia Argentina) or up-ice sites (e.g. close to the actual glaciers margin location) with potential to date the Lateglacial and Holocene glacial activity, or key meltwater paths during deglaciation that will improve the understanding the glacial dynamic in the area during the last glacial cycle.