



Soil geomorphology and morphometric analysis to approach denudation rates and geomorphological evolution of Limnopolar basin; Byers Plateau

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Limnopolar Lake is located in Byers Peninsula Plateau at 85-100m a.s.l. in maritime Antarctic environment. The peninsula, in the western end of Livingston Island, (latitude 62°34'35" S, longitude 61°13'07" W) has more favourable environmental conditions for soil development than other Antarctic regions. Finished the glacial climate conditions in the area began the weathering and edaphic processes. There are several attempts to date the Domo's Rostch cap melting in Byers peninsula based on limnological records studies giving dates of 9.5, 8.3, 6.0 and 5.0 Ka BP while was dated in 6.3 Ka BP in the basis of neotectonic approach. Nevertheless some authors have documented a period of glacial re-advance in the South Shetland Islands from around 7.0 Ka BP, persisting even until 5.0 Ka BP. During cup ice melting mainly isostatic but also tectonic (4%) uplift of the area free of ice started. Based on the date of marine terrace system (70, 55 and 24 m a.s.l.) developed in free of ice coast of the Livingstone Inland a rate of uplift of 0.4 m/Ka was established. General speaking that the melting of the ice cap resulted in the establishment of a lacustrine system spread all over Byers peninsula. At a first stage of evolution waters from the ice melting flooded preexisting topographic depressions lead lakes, while an incipient river networks were developing. Nevertheless, hypsometric integral of Limnopolar watershed shows the existence of at least three downcutting steps into Byers Plateau and the lake is located over the last step above the nick point of the river which is incised into glacial deposit. The base of the sedimentary record of the lake was found at 234 cm of deep and dated at about 8.3 Ka BP but corresponds to glacial sediments. In the same core sample, the change to lacustrine characteristics was found at about 211 cm and dated in 6.7 Ka BP. On the other hand, shore of the lake is excavated at 20 m from the upper part of the basin and the transversal profile of valley shows U- shape seem to indicate that the Limnopolar lake basin should evolve as a glacial alpine valley during a period between Domo's Rostch cap melting and the total establishment of the periglacial conditions. The morphometric analysis of Limnopolar basin using DEM, including hypsometric integral analysis and reconstruction of old non-eroded topography via Gis techniques to estimate valley incision rates in relation to the uplift of the area seems to indicate that post melting of ice cap 9.5 Ka BP ago a less intense glacial re-advance took place in which alpine glacial valleys were developed. Moreover, the geochemical state of Fe, Mn and Organic Carbon of 15 soils sampled in the base on very detailed geomorphological map (1:500) show scarce development of edaphic processes and lack of tephra particles highlighting that the soils began to evolve very recently.