



Frequency of event deposits reflecting glacial/interglacial conditions during the last ca. 50,000 years in the south Patagonian maar lake Laguna Potrok Aike, Argentina

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Laguna Potrok Aike is a 100m deep maar lake located in the dry steppe of southern Patagonia. The catchment area of >200km² mainly consists of till from Bella Vista and Río Ciaiike Glaciations as well as of alkali-olivine basalts of the Pali Aike Volcanic Field. Today's regional climate is affected by the Southern Hemispheric Westerlies and the rainshadow effect of the north-south striking Andean mountain chain. Since lakes are valuable terrestrial paleoclimate archives, sediments of Laguna Potrok Aike should reflect shifts of mid latitude wind and pressure fields as well as precipitation changes in southeastern South America. Aiming at the reconstruction of past climate, the deep drilling at Laguna Potrok Aike was accomplished in the framework of the ICDP project PASADO during Sept. to Dec. 2008.

By correlation of three holes drilled at Site 2 ca. 700 m south of the lake's center, a composite profile of 106.09 mcd (meters composite depth) was established. According to the lowermost 14C-age of aquatic macro remains from 80.6 mcd, the entire record comprises at least 50,000 years. The initial lithological description indicates that 50.74 m (i.e. 47.8%) of the sediment record consists of remobilized sediment (turbidity currents; homogenites; ball and pillow structures, gravel layers, slumps). Such deposits are almost absent in the top 12 mcd, where laminated clays and silts dominate. Correlation with an existing piston core allows a temporal relation to the Holocene. Apart from obviously remobilized deposits Holocene sediments are distinguished from Late Glacial deposits by a lower frequency of coarse silt/fine sand layers within a silt/clay matrix.

Frequency and thickness of remobilized deposits increase with sediment depth. Most reworked sections are composed of three units: (1) a dark, coarse and fining upward base overlain by (2) a homogeneous layer of silt and (3) clay capped by a relatively thin light colored clay layer. Such sequences were often described as homogenites from marine sediments but are only rarely known from lakes. In the record from Laguna Potrok Aike thickest homogenites reach up to 3 m in thickness. In contrast, turbidites are characterized by a fining-upward pattern of the entire sequence.

Homogenites in lake and marine sediments are generally regarded as representing a record for regional seismicity or tsunami activity. Since homogenites are not only triggered by seismotectonic activity and no such deposits are represented in the Holocene sediments of Laguna Potrok Aike, we hypothesize that homogenite generation could be linked to different climate conditions during glacial times. Reasons for this climate link may be (1) higher clastic input through the main tributary or (2) an extremely low lake level. The first option could be the result of more intense geomorphodynamic processes in the catchment area than today due to periglacial conditions with permafrost, forcing precipitation and melt water to run off superficially. Evidence for permafrost conditions in this region until the end of the last glacial is given by an OSL-dated sand wedge in the catchment area (19.1 ± 1.4 ka). The latter explanation is supported by the occurrence of coarse gravel at the bases of some homogenites as well as by one chaotic gravel-dominated unit between 87 and 89 mcd, considering that the distal core is located 1.8 km from the main tributary.