



Spatial distribution of Late Holocene sediment infill controlled by lake internal depositional dynamics, Laguna Potrok Aike (southern Patagonia, Argentina)

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The maar Laguna Potrok Aike (51°S, 70°W) is situated in the dry steppe environment of southern Patagonia. This 100 m deep lake is a palaeolimnological key site among the emerging terrestrial climate archives of the southern hemisphere and therefore was chosen as an ICDP drilling site. Interdisciplinary multi-proxy sediment studies document the sensitivity of this lacustrine record to palaeoclimatic and palaeoecological variability and inferred a close relation of hydrological variations of the lake to fluctuations of the Southern Hemispheric Westerlies. This study presents analyses of a dense grid of 63 gravity cores from the lake floor documenting processes of late Holocene sediment distribution in the lake.

Using X-ray fluorescence and magnetic susceptibility scanning data, all cores were correlated and linked to a previously established age model (Haberzettl et al. 2005). Thereafter, multi-proxy investigations of selected Late Holocene time windows were conducted. Surface sediment samples were taken from all cores and from 40 additional shoreline samples. The scanning profiles do not allow unequivocal correlation of profundal and littoral cores across the steep slopes. Thus, sub-sampling of five selected time intervals covering distinct lake level stages back to AD 1380 was restricted to 43 well-correlated cores from the deep basin. Geochemical, sedimentological, palynological, diatomological and stable isotope data were used to interpolate distribution maps for all these parameters and for the selected time slices by an exact point kriging method.

The dominance of westerly winds strongly influences the spatial sediment distribution patterns. Modern sediment analyses point to the influence of wave action for littoral areas and sediment relocation to the profundal by wind-driven internal currents. Furthermore, the surrounding geology and geomorphology distinctively influence sediment characteristics. The sub-recent spatial sediment distribution is interpreted in the context of these modern processes. Depositional dynamics are modified by varying lake levels and changing wind patterns during the selected late Holocene time sections. Distribution patterns in the deep basin reveal intensified sediment redistribution during lake level low stands and strengthened winds following the Little Ice Age (around AD 1960). In contrast, Little Ice Age (around AD 1800) conditions with a lake level high stand and less intense westerly winds result in a more homogeneous sediment distribution within the deep central basin.

References

Haberzettl, T. et al. (2005), Climatically induced lake level changes during the last two millennia as reflected in sediments of Laguna Potrok Aike, southern Patagonia (Santa Cruz, Argentina), JOPL, 33: 283-302.