Geophysical Research Abstracts,
Vol. 10, EGU2008-A-10656, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-10656
EGU General Assembly 2008

A multi-proxy approach allows disentangling oxic from anoxic and acid from alkaline conditions during warm and cold periods in a high alpine lake

K.A. Koinig (1), E. Ilyashuk (1), A. Hirt (2), R. Tessadri (3), A. Lami (4), R. Drescher-Schneider (5), B. May (6), D. Wagenbach (6) and R. Psenner (1)

(1) Institute of Ecology, University of Innsbruck, Austria, (2) Institute of Geophysics, ETH-Hönggerberg, Switzerland, (3) Institute of Mineralogy and Petrography, University of Innsbruck, Austria, (4) Istituto per lo studio degli Ecosistemi, CNR, Verbania-Pallanza, Italy, (5) Kainbach bei Graz, Austria, (6) Institute for Environmental Physics, University of Heidelberg, Germany

In order to reconstruct the impact of Holocene climate oscillations, long sediment cores were obtained from an oligothrophic high alpine soft water lake. The lake is located well above the tree line in a catchment that consists predominantly of bare rocks and scree. This allows for the tracing of climate impacts that are independent of vegetation changes. The sediment cores were sliced in continuous 1cm layers which cover the entire lake history from the last deglaciation to present. Multi-proxy analyses include geochemistry, mineralogy, magnetic properties, diatoms, chironomids, pollen, and pigment records.

The comparison of these records allows disentangling climate-driven in lake processes, especially changes in alkalinity and redox conditions, from catchment processes (e.g. erosion). While the geochemical profiles mainly depict changes in redox (e.g. Mn/Fe ratio), the mineralogical record reflects changes in the alkalinity in the hypolimnion with extensive Siderite formation. Both processes are related to the duration of stratification which lasts longer during very cold periods with long lasting ice cover or, in contrast, during warm and more productive periods. The warm and cold periods are clearly distinguished in the chironomid records and are confirmed by the pollen and plant macrofossil records. Several horizons with concurrent changes in mineral-

ogy, geochemistry, organic parameters, chironomids, pigments and mineral magnetic records were observed in Schwarzsee ob Sölden: e.g. during the onset of the lake, and around the 8.2 kyr event, but also the rapid cooling around 4700BP, and the cooling around 3500BP when most parameters show statistical significant changes. The study emphasizes how effective a multi-proxy approach allows for a detailed interpretation even of seemingly contradicting and concurrent results.