



Millennial long near-annual summer temperature reconstruction from abiotic sediment characteristics of varved Lake Silvaplana (eastern Swiss Alps)

M. Trachsel (1), C. Kamenik (1), M. Grosjean (1), I. Larocque (1), A. Blass (2), and M. Sturm (2)

(1) Oeschger Centre for Climate Change Research and Institute of Geography, University of Bern, Bern, Switzerland , (2) EAWAG, Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland (trachsel@giub.unibe.ch)

In this study we present a summer temperature reconstruction based on multiple geochemical and sedimentological climate proxies from annually laminated Lake Silvaplana (eastern Swiss Alps), covering the last millennium. These proxies, including mass accumulation rate, biogenic silica flux, XRD peak intensity ratios and in situ reflectance spectroscopy reflect summer temperature. Individually they show excellent calibration statistics on subdecadal time scales (Blass et al. 2007, Trachsel et al. 2008) and compare well with alpine tree-ring reconstructions and climate field reconstructions. The combined response of the proxies to climate state variables was assessed using redundancy analysis (RDA).

After evaluating different regression and calibration models such as principle components regression, ordinary least squares regression and partial least squares regression the most parsimonious model was used to infer summer temperature. Our multi-proxy reconstruction does not show a distinct summer temperature cooling during Little Ice Age, whereas a climate amelioration was reconstructed during medieval times.

References:

Blass, A., Grosjean, M., Troxler, A., and Sturm, M. (2007). How stable are twentieth-century calibration models? A high-resolution summer temperature reconstruction for the eastern Swiss Alps back to AD 1580 derived from proglacial varved sediments. *The Holocene*.

Trachsel, M., Eggenberger, U., Grosjean, M., Blass, A., and Sturm, M. (2008). Mineralogy-based quantitative precipitation and temperature reconstructions from annually laminated lake sediments (Swiss Alps) since AD 1580. *Geoph. Res. Lett.*