

The sedimentation of the last few centuries in three proglacial lakes, Upper Engadine, Switzerland

A. BLASS^{1,2}, RAPHAEL BÜHLER², M. GROSJEAN¹, STEPHAN MARGRETH³ & M. STURM²

¹NCCR Climate, Bern, Switzerland (alex.blass@eawag.ch)

²Surface Waters, EAWAG, Dübendorf, Switzerland

³Department of Geography, University of Zurich, Zurich, Switzerland

Three lakes were selected in the Upper Engadine that are located very closely to one another, but at two different altitudes. Lake Sils and Silvaplana are situated in the main valley at about 1800 m a.s.l. Lake Tscheppa lies just above, about 800 m higher. Size and catchment area differ, but all of them are proglacial lakes, experience similar climatic conditions and have almost mere crystalline rocks in their catchments.

However, their sediments look different. They range from annually laminated sediments in Lake Silvaplana to faintly laminated deposits in Lake Sils and Tscheppa. The very recent sediments of Lake Sils and Silvaplana, both fed by nutrient-rich sewage since the late 19th century, are characterized by frequent black layers whereas the uppermost sediments of the remote Lake Tscheppa are free of black layers. Fraction of biogenic silica (mainly diatom frustules) is with up to 30 % clearly highest in Lake Tscheppa while in both other lakes a maximum of 11 % is measured (Tab. 1). Total carbon content, that is about equivalent

to the organic carbon content, is also highest in Lake Tscheppa.

So Lake Tscheppa seems to be almost unaffected by human impacts as reported for the other lakes in the valley and, therefore, the ideal partner to calibrate human induced eutrophication of Lake Sils and Silvaplana.

BLASS, A., ANSELMETTI, F. S., GROSJEAN, M. & STURM, M. (submitted) The last 1300 years of environmental history recorded in the sediments of Lake Sils (Engadine, Switzerland): *Eclogae Geologicae Helveticae*.

LIMNEX (1994) Gewässerzustand und Gewässerschutzmassnahmen im Oberengadin. Bericht zuhanden des Amtes für Umweltschutz, Kanton Graubünden, 75 p.

OHLENDORF, C., NIESSEN, F. & WEISSERT, H. (1997) Glacial varve thickness and 127 years of instrumental climate data: a comparison. *Climatic Change*, 36, 391-411.

| | Lake Silvaplana | Lake Sils | Lake Tscheppa |
|---|---|---|---------------------------------------|
| Altitude, m a.s.l. | 1791 m | 1797 m | 2620 m |
| Volume | 127x10 ⁶ m ³ (LIMNEX 1994) | 137x10 ⁶ m ³ (LIMNEX 1994) | < 5x10 ⁶ m ³ |
| Catchment area | 129 km ² | 46 km ² | 1.5 km ² |
| Sediments | Annually laminated, black top layers | Faintly laminated, black top layers | Faintly laminated, no black layers |
| Mean sedimentation rate last 200 yrs | 3 mm/yr | 0.7 mm/yr | 1.5 mm/yr |
| Biogenic silica production, weight percent | 0.25-11% | 0.5 - 7 % | 3-30% |
| Total carbon (= organic carbon), weight percent | 0.5 - 3% (Ohlendorf et al. 1997) | 0.5 - 3 % (Blass et al. submitted) | 1-7 % |