

**Supplementary information: Materials and Methods****Reconstruction of postglacial to early Holocene vegetation history in terrestrial Central Europe via cuticular lipid biomarkers and pollen records from lake sediments**

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**Study site**

Lake Steisslingen is situated west of Lake Constance in Southern Germany. It was glacially formed from a block of dead ice at the end of the Würm glaciation. Glauconitic sandstones from the Obere Meeres Molasse (OMM) and marls and sandstones from the Untere Süßwasser Molasse (USM) from the Alpine Tertiary Molasse Basin, crop out in the lake catchment. The Quaternary cover consists of Würmian moraines left by the Rhine glacier. The main water supply derives from submerged springs situated on the western slope of the lake bottom at a water depth of 8-10 meters. Today the lake has a watertable at a constant altitude of 446 m above sea level. The maximum length of the lake is 600 m, the maximum width 255 m. The deepest point with a water depth of 20.5 m is situated in the southeast part of the lake. The presently mesotrophic lake is oligomictic. Lake water is characterized by high conductivity and high SO<sub>4</sub>-content. The thermo- respectively the chemocline is situated in a water depth of 11–15m. The lake is surrounded by meadows and cultivated land.

**Coring**

Several piston cores (STK2, 7, 8) were taken in the profundal region of the lake with a modified Kullenberg-piston-corer constructed by R. Niederreiter, UWITEC, Mondsee, Austria. Cores were drilled with an Atlas Copco, Pio 130. The cores in overlapping sections of about 2 m length were transported to Göttingen, carefully opened, described, photographically documented and stored in darkness at 8° C. Core description and dating is given in Eusterhues et al. (2002).

Eusterhues, K., Lechterbeck, J., Schneider, J., and Wolf-Brozio, U., 2002, Late- and postglacial evolution of Lake Steisslingen: I. Sedimentary History, palynological record and inorganic geochemical indicators: Palaeogeography, Palaeoclimatology, Palaeoecology (accepted and in press, 12 p.)

### Geochemical Methods

Sediments were oven-dried at 45°C and ultrasonically extracted four times (25min each) with dichloromethane:methanol (93:7, v/v). Excess solvent was rotary-evaporated followed by elimination of native sulphur by addition of activated copper flakes.

Present day plant leaves, needles, and blades were obtained from botanical gardens in Bonn and Tübingen. Cuticular waxes of fresh samples were lyophilised and subsequently extracted with a mixture of *n*-hexane:dichloromethane (9:1, v/v), by dipping plants for 2 minutes into a solvent filled beaker. The extract was filtered, dried and then dissolved in *n*-hexane for GC analysis.

Separation of total sediment extracts was performed by SPE (Solid Phase Extraction) yielding three fractions: i) aliphatic hydrocarbons, aromatic hydrocarbons, and ketones (eluted with 6.5ml *n*-hexane:dichloromethane, 8:2 v/v), ii) *n*-alcohols (eluted with 7.5ml *n*-hexane:dichloromethane, 8:2 v/v), iii) carboxylic acids, sterols, and other heterocompounds (eluted with 6ml diethylether:acetic acid, 99:1 v/v). The first fraction containing *n*-alkanes was dried and then re-dissolved in *n*-hexane:dichloromethane (99:1 v/v) for GC analysis.

Gas chromatography and mass spectrometry were carried out utilizing Hewlett-Packard instruments. GC-FID analyses employed a HP5890 instrument equipped with a HP5 column of 50m length, 0.25mm ID, and 0.25µm film thickness. Following on column injection, the oven temperature program started at 70°C, at a heating rate of 10°C/min to 140°C, then 5°C/min to 320°C, followed by an isothermal period of 60 minutes. For quantifications a perdeuterated internal standard *n*-C<sub>24</sub>D<sub>50</sub> was added.

GC/MS analyses was carried out for compound identification on a single quadrupole HP5890/5989A MS Engine instrument. Ionisation energy was kept at 70eV, and full scans collected from 50 – 650 amu. GC conditions were identical to GC-FID measurements with the transfer line held at 290°C. Peak identification was done by comparison with published mass spectra and retention times.

### Palynological Methods

The profundal sediments of Lake Steisslingen were investigated by high-resolution palynological analysis. Samples were taken from core STK2 in 1 cm sections. The Late Glacial samples cover time spans between 32 years and 128 years; the average time-resolution is 90 years. Prior to further processing, lycopodia tablets (Stockmarr 1971) were added; the samples were treated with HCOOH, hydrochloric acid, acetolysis, and hydrofluoric acid, and then stored in glycerine. For

the Late Glacial 58 samples were analysed. At least 500 arboreal pollen were counted in each sample. The profile is zoned by cluster analysis using the Edward's and Cavalli-Sforza's chord distance measure of CONISS (Grimm 1987).

Grimm, E. (1987): CONISS: A FORTRAN 77 program for stratigraphically constrained cluster analysis by the method of incremental sum of squares. *Computers and Geosciences* 13: 13 – 35.

Stockmarr, J. (1971): Tablets with spores used in absolute pollen analysis. *Pollen et Spores* 13: 615 – 621.