Supplementary material

Table 1. Overview of sample preparation methods applied at the ETH 14C laboratory

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|  | **Method** | **Step1** | **Step2** | **Step3** | **Step4** | **Step5** | **Step6** | **Comments** |
| **Material** |  |  |  |  |  |  |  |  |
| Charcoal, wood, macrofossils, OM/Humin fraction (insoluble fraction) | ABA 60°C | 0.5 M HCl, 60°C, 1 hr | 0.1 M NaOH, 60°C, 1 hr | 0.5 M HCl, 60°C, 1 hr | dry / freeze-dry |  |  | freeze-dry macrofossils and all small and fragile material |
| sediment, peat | ABA 60°C strong | 1.0 M HCl, 60°C, 1 hr+ | 0.1 M NaOH, 60°C, 1 hr+ | 1.0 M HCl, 60°C, 1 hr+ | dry |  |  | FTIR control for presence of dolomites, long Step1 and or Step3 |
| soil | Acid 60°C | 0.5 M HCl, 60°C, 1 hr |  |  | dry |  |  | FTIR control for presence of dolomites |
| Humic Acid (soluble in base) HA fraction | HA | 0.5 M HCl, 60°C, 1 hr | 0.1 M NaOH, 60°C, 1 hr | centrifuge and collect liquid (Base), add few drops of M HCl, leave it to precip. HA fraction at RT, 1hr+ | centrifuge HA precip, freeze-dry |  |  | applied to: poorly preserved charcoals dissolving quickly, sediment, soils, peat |
| wood (min. 30 mg of dry wood), no waterlogged wood | BABAB | 1 M NaOH, 60°C, 8-12 hrs | 1.0 M HCl, 65-70°C, 1 hr | 1 M NaOH, 65-70°C, 2 hrs | 1.0 M HCl, 65-70°C, 15 min | 5% NaCl02+0.1ml 0.5M HCl, 70 C, 2hrs | freeze-dry | waterlogged wood is not suited for cellulose separation |
| canvas, paper | ABA 60°C | 0.5 M HCl, 60°C, 1 hr | 0.1 M NaOH, 60°C, 1 hr | 0.5 M HCl, 60°C, 1 hr | dry |  |  |  |
| silk, wool, parchemnt | ABA 20°C | 0.5 M HCl, 20°C, <1 hr | 0.1 M NaOH, 20°C, <1 hr | 0.5 M HCl, 20°C, <1 hr | freeze-dry |  |  |  |
| canvas, paper, parchment, textiles, bone, ivory, antler | Solvents | Hexane, 1 hr+ | Aceton, 1 hr+ | ethanol, 1 hr+ | chloroform, 1 hr+ |  |  | prior to ABA if FTIR indicates contamination; multiple washes; cross check with FTIR after S-treatment |
| Bones | Ultra-Filtration | demineralization, 1M HCl, 5°C, couple of days, check condition, pH | 0.5 M NaOH, RT, 20 min | 0.25 M HCl, RT, 1 hr | Gelatenization: 0.001 M HCl, 65°C (oven or shaker table) , >17hrs | Ultra Filtration (30 kDa Millipore, Millex Glasfaser filter) | freeze-dry |  |
| cremated bones | cremated bones | 2x 15 min ultra sonic in MilliQ , dry | 1.5 % NAOCl, RT, 48 hrs | 0.1 M HCl, RT. 24 hrs | Dry, crush | ca. 200 mg to glass vials (Gasbench) for acidification with conc. H3PO4 |  | CO2 has to be purified prior to graphitization (Ag, 500°C) |
| Mortar | SD3sec | weigh 50-100 mg of pre-sieved fraction 45-63µm | evacuate special chamber containing mortar and conc. H3PO4 | mix mortar and acid, collect fraction dissolving in first 3 sec. Freeze in LN | collect fractions dissolved in 3 sec intervals (timed), freeze in LN |  |  |  |
| carbonates | carbonates | treatment specific to material for example leaching of shells | ca. 10 mg to glass vials (Gas Bench) for acidification with conc. H3PO4 |  |  |  |  | Lime Lumps, shells, foraminifera, pearls, corals, stalagmites |
| paint | binding media | 1 M HCl, 60°C, 1 hr+ |  |  |  |  |  | FTIR to check before combustion (typically GIS) |
| iron | iron | Aceton, ethanol wash, dry | combustion in closed tubes |  |  |  |  |  |
| wine, liquids | LQ | placed in closed tubes, frozen when evacuated before torch sealing tubes | Combustion in closed tubes |  |  |  |  |  |