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Effects of sample preparation on stable isotope measurements of tree rings

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Sample preparation for stable carbon and oxygen isotope measurements of tree rings involves many different steps from taking increment cores in the field, surface preparation of the cores for increasing the visibility of tree ring boundaries for accurate crossdating, cutting of individual tree rings, homogenization of wood or cellulose, and cellulose extraction. Although many of these procedures are standardized between laboratories, there still exist uncertainties regarding potential contamination risks. We examined the possible influence of five widely used treatments: i) WD-40 as often applied for cleaning of the increment corers, ii) sanding of the core surface, and iii) chalk, both applied for increasing the visibility of tree-ring boundaries, iv) pencil powder used for marking tree rings for crossdating and v) glue used for mounting of tree cores on core holders. We tested the influence of these five treatments on both carbon and oxygen isotope values of whole wood and cellulose of Fraxinus excelsior, a ring porous tree species and compared them with the isotope values of untreated reference material from the same tree. Our results indicate no contamination risk for WD-40 and sanding. Chalk and pencil powder slightly affected the whole wood carbon isotopic signature but had no effect on oxygen isotope values. Glue can have a significant effect on both carbon and oxygen isotope values of whole wood and cellulose and, hence, its utilization has to be avoided for stable isotope analysis.