



On the impact of environmental factors on the $\delta^{18}\text{O}$ signature of plant material

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Information from the isotopic signature of atmospheric air constituents is an important tool in climate change research: for instance $\delta^{18}\text{O}$ in ice cores, or in cellulose from tree rings is used to deduce former climatic conditions, and in recent times $\delta^{13}\text{CO}_2$ and to a less extent also $\delta^{18}\text{O}$ of CO_2 are applied for the apportioning of global and regional atmospheric CO_2 sinks and sources.

Fundamental processes which cause the specific isotopic characters of sources were identified by a number of laboratory studies. However, investigations focussing on the behaviour in a natural environment are sparse, in particular for $\delta^{18}\text{O}$, and therefore it is still an unsolved question to which extent the laboratory results are reflecting the process-world that takes place under complex natural conditions. We analyzed various kinds of plant samples from different geographical origins in Eurasia. From the results a high variability in the $\delta^{18}\text{O}$ content becomes obvious, affected by several factors: differentiation occurs due to the geographical origin and the herewith related variance in the $\delta^{18}\text{O}$ of the precipitation. Additionally, differences occur at the same location also between different genera, within the same species, and, at the level of individuals, when comparing specific parts of the plants (such as needles, wood, cones). In consequence, a high range of natural variability can be found already on the spot scale - which has to be taken into account when using organic material as indicator for the deduction of former climatic conditions, and on a local to regional scale also for the apportioning of atmospheric CO_2 sinks and sources.