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Sensitivity of stable isotope ratios of tree-rings of Silver fir (*Abies alba* Mill.) in Franconia (Central Germany) to climate and environmental changes

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We constructed 1000-year long carbon and oxygen isotope chronologies of Silver fir (*Abies alba* Mill.) from the temperate region of Franconia (northern Bavaria, Central Germany) with the aim to carry out the climate reconstructions by using of multivariate models. The annual variations of isotope signals in firs were strong influenced by airborne pollutants in the second half of 20th century: the linear responses of ^{13}C; ^{18}O and ^{2}H signals to SO_2, O_3 and dust concentrations were high significant.
Therefore, we used the long meteorological data set, were the disturbed period could be excluded for climate reconstructions. In this case, carbon isotopes correspond most to spring/summer climate conditions as April to August mean temperatures and June/July precipitation amount, oxygen show the strongest correlation to the July relative air humidity and to the April to August mean temperatures. The correlations between tree-ring signals and summer climate are high ($p<0.001$) and stable in time.
We can conclude that in temperate climate zones isotope values in tree rings of German firs i) show a clear climate signals and ii) are particularly sensitive to the regional environmental state. The sensitivity of annual and seasonal tree-ring data will be discussed in terms of specific adaptation of firs to single pollutants.