Deuterium in tree rings: a low frequency climate proxy? - Hope for deuterium in tree rings?

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We measured stable hydrogen isotope ratios in $\alpha$-cellulose from a millennial European larch ($Larix decidua$) chronology from a subalpine valley in Valais, Switzerland. The online equilibration method described in [1] was applied to measure the Deuterium/Hydrogen ratio ($\delta D$) of the non–exchangeable hydrogen. We compared the $\delta D$ chronology to the results from $\delta^{18}O$ measurements of the same cellulose samples [2]. Although both hydrogen and oxygen share a highly similar long term trend, high frequency signals show low coherence. This results are in contrast to the mechanistic model by [3] who assumes a similar pathway for hydrogen and oxygen in woody plants from source water to cellulose synthesis. The comparison of our $\delta D$ chronology to high resolution instrumental meteo data also leads to conflicting results. In this work we thus focused on low frequencies in $\delta D$ to investigate the question whether deuterium in tree rings is a worthwhile climate proxy.

References