Replies to the comments of Referee #1

The Papier deals Witz stabile Isotope in trees at treeline Unsinn holocene tree rings. Although ist is a valuable contribution to the Journal, there are some Major flaws. In the introduction the authors should mention why Isotope data Derived from tree rings are powerful Tools for climate Reconstructions

Following the reviewer's suggestion we added the following sentence in the introduction: “In environments where the trees are rarely moisture stressed, like at the Alps tree-line, the control of $\delta^{13}C$ is the photosynthetic rate, which depends on predominantly on irradiance and temperature. $\delta^{18}O$ probably reflects a combination of the direct temperature effect on the isotopic ratio of precipitation and the indirect evaporative enrichment effect. (McCarroll et al. 2003)” We did not mention dD since its paleoclimatic value is still in its infancy and not yet fully understood.

There is also evidence that in both Species investigated isotope signatures derived from cellulose are comparable to those from bulk wood.

It is known that for carbon, oxygen and hydrogen a correlation exists between cellulose and bulk wood (Gori et al, 2013 and Wieser et al, 2016). However, present work uses samples of subfossil wood, in which the wood composition is variably affected by different states of conservation. For this reason, we chose to analyse the cellulose, although it required additional work.

See Frontiers in plant science 2016,7;799 and agformet 2018,248;251

Thank you for the suggestion of the two very interesting papers we missed before. At line 71 we added the following sentence: “This last point is particularly important, because the trees at the Alps tree-line benefit from an enhanced CO_2 fertilization and from a recent temperature increase (Wieser et al. 2016) that may produce a long term trend in cellulose isotopes. For example Wieser et al. (2018) show that the increase of temperature is cancelled by increasing atmospheric CO2 concentrations in the environment of the Alps treeline under non-limiting water availability. They state that therefore the instantaneous water use efficiency of photosynthesis did not change considerably.”

In fig 1and table 1 please give full names of all the sites

We added the site names in table 1. But the addition of the long and bulky names in Fig. 1 would make it difficult to interpret, so we think it is better to use the codes

The results section line 119- 143 should be moved to methods.

The indicated section presents the properties of the database we interrogated and an initial analysis to understand which of raw, normalized or scaled data are better suited to detect possible trends in the database. So we are convinced that this section belongs to the Result rather than to the Method section.

In the discussion I miss studies carried out in pine and larch at various treeline Sites in the Swiss and Austrian alps. These data also Show that cembran pine and larch Show similar growth and isotope responses during the last decades. This is in contrast to this manuscript and hence should be discussed.

We found only a couple of papers that analysed the age effect in stable isotope in tree rings at mountain treeline, namely Daux et al. (2011) used a larch located at Les Grang, 2050 m.a.s.l. and Esper et al. (2010) used *Pinus uncinata* collected at tree line at about 2300 masl in the Spanish central Pyrenees. This is confirmed by a very recent paper (Büntgen et al, 2020). These papers underlined that the interpretation of the isotopes in the wood of the last decades is particularly complex due to CO_2 fertilization. In this study, we used a population of trees that covers the last 9,000 years, which is better suited to understand the non-climatic trends. In addition, these authors do not mention the cambial age of analysed samples. In case their trees were in the adult phase, the data would not be in contrast with our work.