Response to the editor comments (ACP-2020-1143)

Dear Jan Kaiser,

You fill find below your comments in bold followed by our answer.

The $\Delta(^{17}O)$ uncertainty cannot be be calculated from simple error propagation of the uncertainties in $\delta(^{17}O)$ and $\delta(^{18}O)$ because the latter are correlated. The combined error has to take the covariation between $\delta(^{17}O)$ and $\delta(^{18}O)$ into account. This is confirmed by the Appendix B1 (l. 555 and Fig. B1) where you state that the uncertainties for nitrite standards are 0.8 ‰ $\delta(^{17}O)$ and 1.8 ‰ $\delta(^{18}O)$. A simple error propagation would give a $\Delta(^{17}O)$ uncertainty of 1.2 ‰, but the actual uncertainty is only 1/4 of that (0.3 ‰). 0.3 ‰ would therefore be a more realistic estimate of the overall uncertainty.

Thanks for noticing this error. We revised the $\Delta(^{17}O)$ uncertainty considering the dependency of $\delta(^{17}O)$ and $\delta(^{18}O)$ as recommended and following the error propagation expression:

$$u(\Delta^{17}O) = \sqrt{u(\delta^{17}O)^2 + 0.52^2 \times u(\delta^{18}O)^2 - 2 \times 0.52 \times \mathrm{cov}(\delta^{17}O, \delta^{18}O)}$$

with $\mathrm{cov}(\delta^{17}O, \delta^{18}O) = u(\delta^{17}O) \times u(\delta^{18}O) \times \mathrm{corr}(\delta^{17}O, \delta^{18}O)$

Considering $u(\delta^{17}O)$ = 0.8 ‰, $u(\delta^{18}O)$ = 1.8 ‰ and $\mathrm{corr}(\delta^{17}O,\delta^{18}O)$ = 0.9645 (see figure below), we obtain a $\Delta(^{17}O)$ uncertainty of 0.3 ‰.

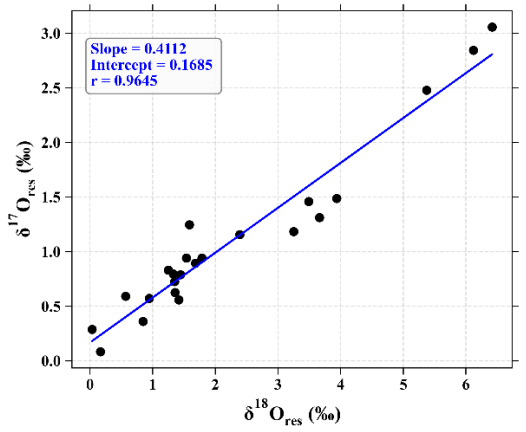

Figure: Correlation plot of $\delta^{17}O$ and $\delta^{18}O$ differences between our measurements of RSIL standards (prepared in the KOH/guaiacol eluted matrix) and their certified reference values over three weeks of storage.

Also, you stated on l. 555 that "If the deviation is constant, it means that the isotopic signal is not degraded with time and its standard deviation is considered as the uncertainty in our $\delta^{17}O(NO_2)$ and $\delta^{18}O(NO_2)$ measurements". This means that the latter uncertainties should be 0.8 ‰ for $\delta(^{17}O)$ and 1.8 ‰ for $\delta(^{18}O)$. It is unclear how you arrive at the higher values of 1.1 ‰ and 2.5 ‰, respectively, further down (l. 561).

We obtained higher values because we first considered the total $\delta^{17}O$ and $\delta^{18}O$ uncertainties i.e. we added the measurement uncertainty and the storage uncertainty. Nonetheless, we admit it leads to an overestimation of the uncertainty as the measurement uncertainty is already considered into the storage uncertainty.

Please revise the uncertainty estimates in the manuscript to more realistic, justifiable values.

The manuscript $\Delta(^{17}O)$ uncertainty has been revised to 0.3 ‰.