

Line 642: The authors describe an increase in the d18O and d13C of CO₂ in nighttime due to respiration and anthropogenic activity. Plant respiration might be a possibility of enrichment when we CO₂-H₂O exchange with leaf water and soil water assuming the d18O of leaf and soil surface water is enriched compared to the ocean. How combustion would cause an enrichment in d18O of CO₂?

There reply:

On this question, we can only refer the referee to the references we provided in this section (Schumacher 2011), which studies the effect of combustion on $\delta^{18}\text{O}$ -CO₂. It would be useful to study combustion products with an in situ isotope analyser within the study region. Unfortunately, this is out of scope/reach, as we do not own such an analyser.

Schumacher et al., 2011 reported a combustion experiment for different parts of the plant and also for different plants. However, the maximum d18O value of the combusted CO₂ they reported 30 per mill vs VSMOW (look table 3 of Schumacher et al., 2011). How can a 30 per mill will cause an enrichment in the d18O of atmospheric CO₂. In their conclusion they mentioned combustion might cause enrichment in the oxygen isotope composition of atmospheric oxygen but not the atmospheric CO₂. The enrichment in the d18O of oxygen will arise due to diffusional fractionation during combustion (uncontrolled).