

## ***Interactive comment on “Long-term observation of mass-independent oxygen isotope anomaly in stratospheric CO<sub>2</sub>” by S. Kawagucci et al.***

### **Anonymous Referee #1**

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Due to technical problems ( $\LaTeX$ ) on my side, the "Minor Remarks/Technical Comment" section of the referee report was suppressed. Please find it here :

### **Technical**

Here, some minor suggestions are made that could help improving the manuscript.

p. 15724, l. 2: The term "anomalous" is used in two different ways. Here in the abstract, it refers to  $\delta^{18}\text{O}$  alone. On the bottom of the same page  $\Delta^{17}\text{O} \neq 0$  is called a  $^{17}\text{O}$  anomaly. I recommend that it is better explained what is meant

in each case. In particular, while it seems to have become common practice to talk about the anomalous or mass-independent isotope composition of oxygen bearing species in terms of  $\Delta^{17}\text{O} \neq 0$ , it must be explained in which sense the enrichment of  $^{18}\text{O}$  alone is an anomaly.

- p. 15724, l. 2: The first two lines of the abstract might better go into the introduction, where a "historic remark" would fit better.
- p. 15724, l. 12: wording:  $\delta^{18}\text{O}$  and  $\Delta^{17}\text{O}(\text{CO}_2)$  are not *conserved* quantities, but may be long-time tracers.
- p. 15724: the definition of  $\delta$  - values is missing and should be introduced before  $\Delta^{17}\text{O}$
- p. 15724, l. 24: The anomaly is not related to a photochemical reaction *per se*, which is a chemical reaction caused by absorption of ultraviolet, visible, or infrared radiation (IUPAC Goldbook). It is a thermal (termolecular) reaction that is thought to be important in this context:  $\text{O} + \text{O}_2 + \text{M} \rightarrow \text{O}_3 + \text{M}$ . It should be noted that the two references given also don't support the photochemical aspect of the statement.
- p. 15725, l. 2: is a source  $\rightarrow$  is the source
- p. 15725, l. 7: Here the use of the terminology shows its weakness: Both,  $^{18}\text{O}$  and  $\Delta^{17}\text{O}$  are thought to be transferred via the indicated pathway
- p. 15725, l. 14: The mechanism is incomplete. There are two products in reaction (2), the product channel  $\text{CO}_2 + \text{O}(^1\text{D})$  is missing (Perri et al. (2003))
- p. 15725, l. 21: difficult  $\rightarrow$  difficult
- p. 15726, l. 1: Since 1985 .... The two sentences that follow are misleading, because the long-term period, that is covered by the measurements, starts at 1991. Please specify.

- p. 15726, l. 2: Some of the  $^{17}\text{O}$  and  $^{18}\text{O}$  data seem to be reported too by Kawagucci et al. (2005)
- p. 15726, l. 5: in the past 14 years long-term sampling → in the 14 years long-term sampling period
- p. 15726, l. 6: when the sampling area was inside the polar vortex → when air masses inside the polar vortex were collected
- p. 15727, l. 2: Kawagucci et al., 2006 → Kawagucci et al., 2005
- p. 15730, l. 10: compositions → composition
- p. 15732, l. 13: adjust super and subscripts
- p. 15733, l. 18: Van Egmond → van Egmond
- p. 15734:  $\delta^{17}\text{O}$  →  $\Delta^{17}\text{O}$  in tablehead
- p. 15737: Figure caption: A terrestrial → The terrestrial

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