Interactive comment on “Does $\delta^{18}O$ of $O_2$ record meridional shifts in tropical rainfall?” by Alan M. Seltzer et al.

Anonymous Referee #2

Received and published: 31 July 2017

It has long been suspected that changes in d18Oatm and the Dole effect are dominated by changes in the hydrological cycle in low latitudes. With better analyses methods it surfaced that also the long lived d18Oatm signal has a millennial scale component. Supported by recent complex modeling efforts (Reutenauer et al., 2015) Seltzer et al., qualitatively explain the observed d18Oatm variations with changes of the GPP weighted precipitation signature in the tropics. They provide a thorough and very complete analysis of the individual components of the oxygen cycle. Although the idea of tropical hydrology dominating the d18Oatm signal is not new their analysis convincingly demonstrates that shift in the tropical GPP weighted precipitation pattern can explain the observations.

Minor comments: Introduction: Please explain in 2-3 sentences what DO events are.
Page 3, lines 19-20: This statement is wrong. The analysis in Bender et al., 1994 is based on the Vostok CH4 data available at that time. It simply did not have the resolution to detect millennial variability and neither did the d18Oatm record. Please rephrase to make clear that the statement in Bender et al. is of a more general nature.

Page 6, line 15: add MODERN mean monthly gridded datasets

Page 6, line 24: I do not understand the meaning of this sentence; “…GPP refers to an emission, rather than a flux…” My understanding is that equation 4 is a GPP weighted d18O precipitation signature and equation 5 is the GPP weighted location of this mean precipitation.

Page 9, line 20: “independently” of what?

Page 10, line 14: Briefly explain the importance of relative humidity in terrestrial oxygen production.

Page 10, line 20: add (East Asian Summer Monsoon) after EASM