

Interactive comment on “The Earth’s climate system recurrent & multi-scale lagged responses: empirical law, evidence, consequent solar explanation of recent CO₂ increases & preliminary analysis” by J. Sánchez-Sesma

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This comment deals only with the atmospheric CO₂ data plotted in the discussion paper, an issue which - as far as I was able to follow - has not yet been brought up by the reviews published until today.

In Figures 9 and 10 CO₂ is plotted based on stomata-based reconstructions for the last 12,000 years (the Holocene) with zoom on the more recent period (last 2000 years) and is then compared with some calculated CO₂ values, which seemed to show similar variability.

The chosen CO₂ proxy (stomata-based) is known to be a poor recorder of the small scale variability of CO₂ we seen during these rather stable time periods. They compare especially weak against ice core CO₂ data, which are still believed to be a recorder of ancient atmospheric concentrations. Several papers have discussed these discrepancies and weaknesses of the stomata-based CO₂ proxy in detail, (e.g. Ahn et al., 2014; Indermühle et al., 1999; Köhler et al., 2015).

Furthermore, it is well known and established, that the ice core CO₂ of the recent past (last 2000 years) from the Law Dome ice core, overlaps without any offset with the instrumental CO₂ measurements, which started in year 1958 in Manua Loa, Hawaii, giving firm evidence that ice cores indeed record atmospheric CO₂ without any significant offset (MacFarling-Meure et al., 2006; Rubino et al., 2013).

The knowledge on CO₂ variability over the last 2000 years has been extended by some CO₂ data from the West Antarctic Ice Sheet Divide ice core (Ahn et al., 2012; Bauska et al., 2015). In addition to the Law Dome data we now know that CO₂ varied between 270 and 285 ppmv during the last 2000 year, starting to rise due to anthropogenic emissions around year 1750 CE from 278 ppmv to nowadays around 400 ppmv. The variability of CO₂ between 270 to 390 based on stomata and plotted in Figure 10 is not supported at all by the more reliable ice core CO₂ data.

For the Holocene (last ~12,000 years) CO₂ variability is - again based on ice core data (Monnin et al., 2004; Elsig et al., 2009) - well established to be between 255 and 285 ppmv, consisting of a ~10 ppmv decrease between 11,000 and 8,000 years before present and a gradual rise thereafter. Non of that is found in the stomata-based CO₂ proxy record plotted in Figure 9.

These misfits of plotted CO₂ values (based on stomata CO₂ proxies) from ice core CO₂ are severe shortcomings of the study. If ignored, it would suggest, that our knowledge of CO₂ based on ice cores is wrong, for which no futher support is given. For any further details on the difference of ice core based CO₂ and stomata-based CO₂ please

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refer to other papers discussing those in detail (Ahn et al., 2014; Indermühle et al., 1999; Köhler et al., 2015).

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[Interactive comment on Earth Syst. Dynam. Discuss.](#), doi:10.5194/esd-2016-38, 2016.

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