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Interactive comment on "Impact of anthropogenic activities on global land oxygen flux" *by* Xiaoyue Liu et al.

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Thank you for your comments. The Oxygen cycle and Carbon cycle are actually two independent cycles. Although they are dependent on each other by some reaction processes such as respiration and photosynthesis (Keeling and Manning, 2014), they also act separately via other processes including photolysis of water, oxidation of minerals, etc., in which carbon doesn't involve (Berner, 2006; Petsch, 2013; Royer, 2013). Therefore, the dataset of global Oxygen cycle should be necessary.

As an integral part in the research of the Oxygen cycle, the oceanography community issued the Kiel Declaration (https://www.ocean-oxygen.org/declaration), addressing that the ongoing loss of oxygen is a rapidly increasing threat to marine ecosystems

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Discussion paper

and improved understanding of its causes and consequences is immediately required. In addition, in the field of geology, scientists are also making their effort to investigate the mechanism of The Great Oxidation Event (GOE) (Bekker et al., 2004; Canfield, 2014; Kump, 2008; Lyons et al., 2014) and rebuild the evolution of atmospheric oxygen during geologic period (Berner, 2009; Krause et al., 2018; Royer, 2013). The Oxygen cycle deserves the attention of the science community and the research on global Oxygen cycle should be valued.

The balance of oxygen sources and sinks involves an enormous array of diverse interactions between various “spheres” in the Earth System, including the biosphere (life), atmosphere (air), hydrosphere (water), lithosphere (rock) and anthroposphere (human). A complex web of chemical interactions of different timescales between the “spheres” have ultimately stabilized the atmospheric oxygen concentration during the past hundreds of millions of years. Oxygen is the only element that involves in all of the 5 “spheres” in the Earth System. In this paper, we aim to establish a global oxygen budget as comprehensive as possible. Therefore, the inclusion of human and livestock respiration is an essential part of the oxygen budget.

Indeed, we have been aware of the fact that there is no imminent threat of significant atmospheric O2 loss. Even though the decline of O2 doesn’t seem to bring about significant adverse effects on the survival of human for now, no one can assure that it will not pose a serious threat in the future. The imbalance between the CO2 and O2 budget has revealed the existence of the issue. Therefore, the research on the global O2 budget, along with the O2 flux data proposed in our paper, is of great value. Although this dataset is not perfect, we have made the first step. We hope that the data provided in this paper should excite the interest of users in a broad range of multi-disciplines (e.g. environmental science, bioscience, climate change, etc.).

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