

Biogeosciences Discuss., referee comment RC3 https://doi.org/10.5194/bg-2021-4-RC3, 2021 © Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.

## Comment on bg-2021-4

Anonymous Referee #3

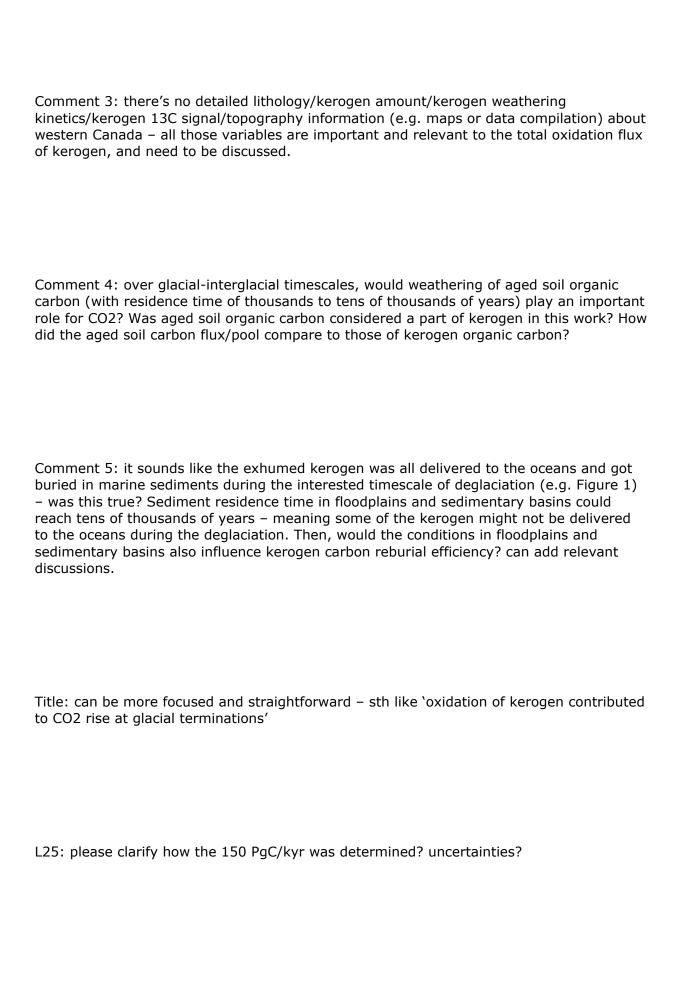
Referee comment on "Ideas and perspectives: Emerging contours of a dynamic exogenous kerogen cycle" by Thomas M. Blattmann, Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-4-RC3, 2021

This work hypothesizes that de-glaciation and weathering of kerogen-rich lithologies in western Canada made a major contribution to CO2 rise at glacial terminations by compiling and re-interpreting empirical evidence. I have several comments regarding the interpretation and methods of the manuscript, which I hope to help to improve the manuscript. I'd recommend revisions before acceptance for publication.

## Major comments:

Comment 1: 'kerogen' should be clearly defined: how does this term compare to the other terms used in the relevant studies, for example, rock-derived organic carbon, and petrogenic carbon. Do those concepts overlap/differ or are they the same? Would organic carbon in metamorphic rocks also be termed 'kerogen'?

Comment 2: it needs to acknowledge existing understandings/studies about carbon fluxes during glacial-interglacial time periods. What did previous work find/conclude about glacial terminations and CO2 rise? How does the kerogen weathering hypothesis in this manuscript differ from the previous studies? What were the magnitudes of other carbon fluxes during deglaciation (e.g. the carbon exchange between the atmosphere and ocean reservoirs) and how do those compare to the kerogen weathering flux?



L30-35: should also introduce major thoughts of the causes of glacial terminations
L40-45: this carbon cycle framework is very incomplete – at least should put in silicate weathering, see more in Berner et al. (1983)
L100: Equation 2 is unclearexplain what Zeng (2003), Simmons et al. (2006), and Horan et al. (2017) have done? Where were those studies conducted? What did they find?
L125-130: how much did the 14C composition of the then atmosphere-ocean carbon reservoir change? Any comment on 13C?
L230-235: could expand a bit and discuss some existing mechanisms – their pros and cons?
L500 – Table 1: how did the laboratory experiment-based results translate to a flux of unit area? for example, bituminous coal and oil sands – how to convert the reaction kinetics results of several samples to fluxes over certain areas of landscapes?
L525: Figure 4 can be improved by displaying topography and lithology maps