Response to review

Respect Dr. Bouillon and Dr. Pokrovsky:

We would like to thank Biogeosciences for accepting our manuscript.

We thank the reviewer and editor for their valuable comments on revised manuscript. Based on the comments, we have made carefully revision.

Editor's Comment:

Comment 1. L38 and L 218: detection limits: detection limit

Response: Thanks. We have changed to detection limit in the revised manuscripts.

Revised manuscripts: "the concentrations of DISe were extremely low (near or below the detection limit, i.e. 0.0063 nmol L^{-1})" in *page 2 line 37-38.*

*"*DISe concentrations were extremely low (near or below the detection limit) in the freshwater reach and increased towards the sea*"* in *page 9 line 217-219.*

Comment 2. L48: "The TDSe flux delivered by the peat-draining rivers exceeded other small rivers reported so far": exceeded those reported for other small rivers ?

Revised manuscripts: "The TDSe flux delivered by the peat-draining rivers exceeded those reported for other small rivers" in *page 2 line 48-49.*

Comment 3. L66: "in diatom": in diatoms

Revised manuscripts: ""Direct uptake of seleno-methionine and seleno-cystine has been demonstrated in diatoms" in *page 3 line 65-66.*

Comment 4. L88: "in the Siberian": awkward, rephrase or be more specific

Revised manuscripts: "In the high-latitude peatland-draining rivers, dissolved Se concentrations are spatially variable, with concentrations of up to 13 nmol L^{-1} being observed in northern Minnesota, US (Clausen and Brooks, 1983), from 0.38 to 5 nmol L^{-1} in the Krycklan catchment, Sweden (Lidman et al., 2011) and from 0.25 to 1.25 nmol L^{-1} in the lakes and rivers of western Siberian" in *page 4 line 84-88.*

Comment 5. L191: "draining from peatland": draining peatlands

Revised manuscripts: "The water chemistry in the freshwater reach of the Maludam, Simunjan, Sebuyau and Samunsam rivers are typical of blackwater rivers draining peatlands with acidic pH and low DO concentrations" in *page 8 line 190-192.*

Comment 6. L270: "were removed in the brackish water": in the brackish water region

Revised manuscripts: "DISe increased with salinity but behaved non-conservatively and was removed in the brackish water region" in *page 11 line 269-270.*

Comment 7. L305: "be expected to": are expected to

Revised manuscripts: "thus DISe concentrations are expected to increase with DO values" in *page 12 line 304-305.*

Comment 8. L323: “which were contrast with”: which contrasts with, or: which is in contrast with

Revised manuscripts: “During estuarine mixing, reversed DISe concentration–salinity relationships were observed in the Rajang, Maludam, Sebuyau, and Samunsam estuaries (Fig. 3, Fig S5), which contrasts with those reported for other estuaries***”*** in *page 13 line 321-324.*

Comment 9. L373: “liner”: linear

Revised manuscripts: “Moreover the peat-draining rivers demonstrated a linear relationship between DOSe concentrations and HIX and humic-like CDOM components (Fig. 4d, 4e) indicating that DOSe may be associated with dissolved humic substances.***”*** in *page 15 line 375-378.*

Comment 10. L379-380: “the humic-like C3 component (Fig. 5b) which derived corresponded to aromatic and black carbon compounds”: something wrong with this sentence, rephrase.

Revised manuscripts: “In addition, the positive correlations between DOSe and the humic-like C3 component (Fig. 5b), i.e. aromatic and black carbon compounds, suggest a strong association of DOSe to these high molecular weight DOM***”*** in *page 15 line 378-381.*

Comment 11. L382-383: “Pokrovsky et al. (2018) also found that Se were transport in the form of …”: was transported in the form of

Revised manuscripts: “Pokrovsky et al. (2018) also found that Se was transported in the form of high molecular weights organic aromatic-rich complexes from peat to the rivers and lakes in the Arctic.***”*** in *page 15 line 381-383.*

Comment 12. L386: remove “that”

Revised manuscripts: “Bruggeman et al. (2007) and Kamei-Ishikawa et al. (2008) both found that 50% to 70% of Se(IV)–humic substances associates had high molecular weights (>10 kDa), consistent with our findings. ***”*** in *page 15 line 383-386.*

Comment 13. L426: “were exceed the other rivers”: but exceeded the other rivers

Revised manuscripts: “The TDSe yields for Rajang and Maludam were just below the second largest river Changjiang and the polluted Scheldt River, but exceed the other rivers***”*** in *page 17 line 424-426.*

Comment 14. L427: “As for ..”: awkward sentence, rephrase

Revised manuscripts: “The magnitude of DOSe yields obtained from Rajang and Maludam was one to two orders of degree higher than those in other reported rivers***”*** in *page 17 line 426-428*

Comment 15. L452: “The TDSe flux delivered by the exceeded other small rivers”: something missing here: delivered by what ?

Revised manuscripts: “The TDSe flux delivered by the peat-draining rivers exceeded other small rivers” in *page 17 line 450-451.*

Comment 16. Table 1: ‘coverage rate’: this is not a rate, rephrase to for example ‘peatland cover (%)’

Response: We have changed to “Peatland cover” in *page 26 line 710.*

Reviewer's comments:

Comment 1.L85 spatially

Revised manuscripts: *"*In the high-latitude peatland-draining rivers, dissolved Se concentrations are spatially variable, with concentrations of up to 13 nmol L^{-1} being observed in northern Minnesota, US (Clausen and Brooks, 1983), from 0.38 to 5 nmol L^{-1} in the Krycklan catchment, Sweden (Lidman et al., 2011) and from 0.25 to 1.25 nmol L^{-1} in the lakes and rivers of western Siberian" in *page 4 line 84-88.*

Comment 2.L90 the DOSe is probably

Revised manuscripts: *"*the DOSe is probably the dominated species in peatland-draining river" in *page 4 line 90-91.*

Comment 3.L99 its export by tropical peat-draining…

Revised manuscripts: *"*The current paucity of information on DOSe characteristics and its export by tropical peat-draining rivers remains a major gap in our understanding of Se biogeochemical cycling" in *page 4 line 99-101.*

Comment 4.L383 transported in the form

Revised manuscripts: *"*Pokrovsky et al. (2018) also found that Se was transported in the form of high molecular weights organic aromatic-rich complexes from peat to the rivers and lakes in the Arctic" in *page 15 line 381-383.*

Comment 5.L432 remove one 'roughly'

Revised manuscripts: *"*The roughly estimated TDSe flux from tropical peatland (439,238 km^2, Page et al., 2011) could be around 120× 10^3 kg yr^{-1}" in *page 17 line 430-431.*

Comment 6.L435-438 Rephrase or split into 2 sentences

Revised manuscripts: "It can be expected that increasing anthropogenic disturbing of peat can release a great amount of Se to rivers, and then transported to the coastal areas. The impact of peatland derived Se to the ecosystem should receive more attention in future studies." in *page 17 line 435-438.*

Comment 7.L447-450: Photodegradation and plankton growth were not investigated in this study so it should not be in the Conclusions

Response: Photodegradation and plankton growth were deleted.

Revised manuscripts: "The DOSe fractions may be associated with high-molecular-weight peatland-derived aromatic and black carbon compounds." in *page 18 line 466-468.*