

[Comment from the Referee] *The authors made a great effort to make a selection of their main results and combined figures (e.g. Fig 10) to make a more condensed manuscript. Still, I find the discussion section rather lengthy, and it is hard to find the main messages of the work without reading the text in detail. One suggestion for readability is to change the section titles to more descriptive titles that give a hint to the key message of each section.*

[Author response] Thank you very much for your review and the helpful suggestion on improving the readability of the manuscript. According to your suggestion, we used the more descriptive titles for the Discussion section, which are listed below:

‘5. Discussion

5.1 Inclusion of nutrient cycling improves use efficiencies of other plant resources

5.2 Inclusion of nutrient cycling improves CO₂ fertilization effect

5.3 Ecosystem nutrient turnover and openness indicates model biases in boreal phosphorus availability

5.4 Model biases in stoichiometry indicate need for refinement of process representation

5.5. Nutrient effects on carbon cycling

5.5.1 Inclusion of nutrient cycling improves the inter-annual variability of GPP

5.5.2 Inclusion of nutrient cycling deteriorates phenology and seasonality of GPP

5.5.3 Inclusion of nutrient cycling leads to an underestimation of the land carbon sink

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Besides, the titles for Sect. 2-4 were revised to be more clear and concise as:

‘2. Modelling

2.1 Model description

2.2 Simulation setup

2.2.1 Meteorological data

2.2.2 Land cover

2.2.3 Soil and lithology datasets

2.2.4 Atmospheric nitrogen and phosphorus deposition

2.2.5 Nutrient management

3. Evaluation

3.1 Ecosystem productivity

3.2 Resource use efficiencies

4. Results

4.1 Carbon, nitrogen and phosphorus flows and storages

4.2 Resource use efficiencies

4.3 CO₂ fertilization effect

4.4 Ecosystem nutrient openness and nutrient turnover

4.5 Stoichiometry

4.5.1 Foliar stoichiometry

4.5.2 Soil stoichiometry

4.6 Nutrient effects on carbon cycling

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