

Interactive comment on “Ecosystem respiration, vegetation development and soil nitrogen in relation to breeding density of seagulls on a pristine volcanic island, Surtsey, Iceland” by B. D. Sigurdsson and B. Magnusson

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The author's wish to begin with thanking all the two referees for their constructive criticism, which has significantly improved the manuscript. Their comments can be seen in the following sections. Author's replies are listed below each comment.

Anonymous Referee 2 Received and published: 3 December 2009 Sigurdsson and Magnusson present a study on ecosystem respiration on a very unique substrate, a young volcanic island in Iceland. The authors measured soil respiration and vegetation

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cover, the density of seagull nests and took soil samples. They observed that vegetation cover, respiration i.e. ecosystem activity and nitrogen content was higher on an area that seagulls have colonised than elsewhere. They also constructed a model for vegetation cover and for ecosystem respiration using the nitrogen content as a explaining factor. Author's response: OK

The study addresses a relevant scientific question about factors affecting soil respiration and the paper presents novel data. Author's response: OK

The description of experiments and calculations is sufficiently complete and precise to allow their reproduction by fellow scientists. Author's response: OK

The authors give proper credit to related work and clearly indicate their own new/original contribution. Author's response: OK

The abstract provides a concise and complete summary. Author's response: OK

The overall presentation is well structured and clear. The language is fluent and precise. Mathematical formulae, symbols, abbreviations, and units are correctly defined and used. The number and quality of references are appropriate. There is no supplementary material but it is not needed anyway. Author's response: OK

However, information is missing in methods section as well as the title and objectives do not correspond to the content or conclusions. Author's response: This was also thoroughly commented by Reviewer's 1. Author actions: The authors will add to MM the requested issues and modify the conclusions (see author responses to Reviewer 1).

The discussion on the origin of the respiration is thin considering that it is commonly known that vegetation has higher nitrogen content as well as soil respiration rates compared with bare soil.

Author's response: Yes, of course. The point of the present study was to show HOW this comes about on an 40 year old pristine volcanic island, where there was no or-

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ganic/developed soil when it rose from the sea in 1963 + to report actual RE of such young and emerging ecosystems. The RE:N relationship shown in the present study was only based on soil N (not including the N found in the existing vegetation). Author actions: A discussion on the origin of the respiration (soil vs. aboveground vegetation) will be added.

I find that the manuscript would still need major improvements before publication. Author's response: OK

Specific comments The objective of the study was to investigate biological activity in different vegetation types and development stages on Surtsey, Iceland. In conclusion, the authors state that the amount of nitrogen is the most important factor for the rapid vegetation succession as well as high respiration rates. I think the conclusions correspond better to the content of the paper than the objective and title. The substantial conclusions would be reached if the authors rephrased their objective and aim to correspond to the rest of the text. The title does not clearly reflect the contents of the paper either because the paper is not about vegetation development at all, more about the vegetation cover.

Author's response: Fair point: This was also thoroughly commented by Reviewer's 1. Author actions: The authors will make the requested changes (also see author responses to Reviewer 1).

The scientific methods and assumptions are valid and clearly outlined except for some exceptions: How was the soil depth measured? In section 2.2 authors mention that rocks existed at the sites. What do the authors think about the rocks and do they affect the result somehow? I understood that the measurements were not carried out on a rocky surface due to practical issues. Author's response: Good point. Such patchy (rocky) plots existed in both ecosystem types and therefore the authors don't believe that Author actions: The authors will add a sentence about this issue in the discussion – and include the issues mentioned in the revised MM chapter

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The exact hour of measurements should be mentioned too. The authors have performed the measurement four times at 21 measuring plots and therefore I assume that the measurements were made at different times and even on two different days. Does the measuring hour have an effect on the results? Do the results differ on different days? Author's response: Fair point: This was also thoroughly commented by Reviewer's 1. Author actions: The authors will make the requested changes (also see author responses to Reviewer 1).

What would be the situation be for example in early or late state of growing season? Author's response: Fair point: This was also thoroughly commented by Reviewer's 1. Author actions: The authors will make the requested changes (also see author responses to Reviewer 1).

The results are somewhat sufficient to support the interpretations and conclusions except that the authors did not actually study other factors than nitrogen and therefore I don't find it appropriate to use an expression such as "The most important factor: : :". I think the authors could also do better in describing or discussing the role of different components in Re, I mean autotrophic and heterotrophic respiration because it is more or less evident that the nitrogen content as well as the soil respiration is higher on the vegetated surface. Do the authors think that the bird dropping and other material that birds have brought play a significant role in respiration?

Author's response: Fair point: This was also partly commented by Reviewer's 1. Author actions: The authors will make the requested changes and add to the discussion on the origin of RE and which factors are likely to have affected it (also see author responses to Reviewer 1).

Technical comments Table 1: I would suggest something more informative title for the column "Flux cover" Author actions: will do.

Figs 1 and 2: I found it a little bit confusing that some values are missing in the series of measuring plots. Could they be renamed for the reader so that they don't have to

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wonder where the results from the plots number 2 and 5 are? However, this is not crucial. Author response: Since these plots represent permanent study plots and their numbers are really “names” that also are used in other publications the authors are quite hesitant to change this; since it is bound to create confusion when the presented results will be used by other scholars doing studies on Surtsey in the future.

In the fig 2, I would change the places of plot numbers 9 and 8. The interval between the number is not equal in the first ones and later the numbers are not below their bars (the 23 is halfway out of the figure). Author actions: Woobs – we will change this (plots 8 vs 9). The latter – the plot numbers not correctly placed compared to the bars is something that happened in the editorial office; we will see to it that it is correct in the final proofs of the paper.

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/6/C3756/2009/bgd-6-C3756-2009-supplement.pdf>

Interactive comment on Biogeosciences Discuss., 6, 8393, 2009.