

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

Anonymous Referee #2

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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 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.

The study addresses a relevant scientific question about factors affecting soil respi-

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ration and the paper presents novel data. The description of experiments and calculations is sufficiently complete and precise to allow their reproduction by fellow scientists. The authors give proper credit to related work and clearly indicate their own new/original contribution. The abstract provides a concise and complete summary. 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.

However, information is missing in methods section as well as the title and objectives do not correspond to the content or conclusions. 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.

I find that the manuscript would still need major improvements before publication.

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.

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.

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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? What would be the situation be for example in early or late state of growing season?

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?

Technical comments

Table 1: I would suggest something more informative title for the column "Flux cover"

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 wonder where the results from the plots number 2 and 5 are? However, this is not crucial.

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).

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