

Interactive  
Comment

# ***Interactive comment on “Effects of seabird nitrogen input on biomass and carbon accumulation after 50 years of primary succession on a young volcanic island, Surtsey” by N. I. W. Leblans et al.***

**Anonymous Referee #3**

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<General comments>

This study has clarified the effects of seabird N input on ecosystem biomass and carbon accumulation by comparing them between inside and outside of the seabird colony at an old volcanic island, Surtsey, in Iceland. As major findings of this paper, authors reported that additional N input by seabird colony had increased ecosystem N and C stocks, total plant biomass, and N use efficiency and had induced a shift from belowground to aboveground in ecosystem C and N stocks. These findings would be worthwhile for some research field such as ecological succession, nutrient limitation,

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or soil development. I have only minor specific comments which should be considered into manuscript by authors before the final publication.

<Specific comments>

Although authors had hypothesized that N accumulation rate inside the seabird colony as 30 kg N ha<sup>-1</sup> based on the previous study (Magnússon et al. 2009), the readers would be appreciate if concise description about how Magnússon et al. (2009) derived this value were presented in this paper.

In the section 4.1, N<sub>2</sub> fixation was discussed as not important source of N because activity of free-living N<sub>2</sub> fixing microbes would be very low due to low soil moisture and temperature. Then, are there no N<sub>2</sub>-fixing organisms other than symbiotic and free living bacteria such as lichen or biological soil crusts (BSC) in this study area? Especially BSC are well known to be an important driver for ecosystem N and C cycling especially in the dry ecosystems including arctic deserts.

I think that a shift in R/S ratio includes different two types of phenomena. The first is morphological changes in same plant species in respond to environmental change such as temperature, water availability, and nutrient status in soil. The second is changes in plant species. For example, if dominant species changed from the species with high R/S ratio to the species with relatively low R/S ratio, the plant-community-level R/S ratio would also decrease. I feel that observed R/S ratio in this study would be largely explained by the latter reason because there was difference in plant community structure between inside and outside of the seabird colony as shown in section 2.1.

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