

1 A simple model for predicting the global
2 distribution of the N₂ fixing host genus *Alnus*
3 *Mill.*: impact of climate change on the global
4 distribution in 2100

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7 **1 Response to Anonymous Referee #2**

8 This paper tried to establish a model predicting the distribution of alder species.
9 The issue is important to estimate carbon cycle in the terrestrial ecosystem
10 coupled with nitrogen. However, the model was too simple to predict the species
11 distribution even in the global scale. The author used only four parameters,
12 Tann, Pann, soil category, vegetation category to construct the model. As the
13 author stated, climate and soil conditions are not sufficiently for the modeling of
14 the distribution of species. The “potential distributional area” will be decreased
15 with increasing the number of assumed limiting factors. In actual, the predicting
16 power of environmental factors for species distribution is very low (sometimes
17 less then 10%) in local scales (Jones et al. 2008 Oecologia; Finn et al. 2010
18 Journal of Ecology; Aiba et al. 2012 Journal of Ecology). Other factors such as
19 seed dispersal limitation, competition or stochastic process are more important.

20 Furthermore, when we construct a distributional model using presence data
21 only (not presence-absence data), we have to pay attention to amount of data
22 lacking and bias, and the distributional area should be represented as the prob-
23 abilities. For example, MaxEnt model is robust even when the sample size is
24 small although the model also have weak points.

25
26 **Specific comments**

27
28 **Referee #2**

29 Title; I recommended to change the title from “... predicting the global distri-
30 bution” to “... predicting the potential global distribution”

31
32 **Reply**

33 done.

34
35 **Referee #2**

36 P13051L15; The author stated that the density if alders amounts 8% of total
37 plant biomass. I think the ratio is too high in accordance with some data base
38 of forest plots such as Ishihara et al. (2011) Ecological Research.

39
40 **Reply**
41 Changed to “up to 8%”.

42
43 **Referee #2**
44 P13052L17; The author stated the most alder species occur on fenlands, in
45 swamp areas, along brooks, rivers, and streams in bogs. However, some species
46 such as *A. firma*, and *A. crispa* occur on steep slopes, then it should be noted.

47
48 **Reply**
49 Information about the distribution of the *A. crispa* and *A. firma* were added to
50 the text (see introduction).

51
52 **Referee #2**
53 Eq. (5) & (6); The variant to evaluate a model should be independent, but
54 these equations include the factor of climates. Statistical analysis such as fig. 4
55 should be conducted by the soil factor and vegetation factor, in addition to “all
56 method”.

57
58 **Reply**
59 Mostly, climate factors are the main determinant for the plant distribution. Soil
60 conditions and vegetation units are effected by climate. Therefore, it is irrelevant
61 to use the soil factor and vegetation factor as single determinant for the modeling
62 of the distribution. Author decided to use the climate+soil, climate+vegetation
63 for investigating of the correlation between the alder distribution and the factors.

64
65 **Referee #2**
66 P13061 4:3; The author used the data from only 13 countries. However, the
67 criteria is unclear. Why did you not use the data such as TW, AT, and PT
68 which had high value of Rec/Grid ratio? I wonder whether the statistical power
69 should be changed if you use the other data in fig. 4.

70
71 **Reply**
72 Each of the selected 13 countries has for the alder distribution more than 1000
73 records. That was the main criteria by selection of the countries.

74
75 **Technical comments**

76
77 **Referee #2**
78 P13060L13; It soils -¿ wet soils?

79
80 **Reply**
81 Changed to “wet soils”

82
83 **Referee #2**
84 Fig. 8 & 9 are not necessary.

85
86 **Reply**
87 The figures are necessary to show the potential alder distribution on global scale
88 since there is no other source except the GBIF database. Therefore I'd like to

⁸⁹ keep the figures in the paper.