Replies to **reviewer 1** of the manuscript:

P. Pinho, M.R. Theobald, T. Dias, Y.S. Tang, C. Cruz, M.A. Martins-Loução, C. Máguas, M. Sutton and C. Branquinho. Critical loads of nitrogen deposition and critical levels of atmospheric ammonia for semi-natural Mediterranean evergreen woodlands.

1	*A more general point is that the paper considers only changes to vegetation and in particular lichens and this is modelled as an ecosystem impact but since most biodiversity is in fact invertebrate biodiversity considering the whole ecosystem the impact might indeed produce a different result.* *The assumption that lichens indicate the effects of n pollution applies to vegaetation only as no studies have been done for invertebrates (but note the papers by Wallis de Vries and van Swaay; van Duinen; Feest and Spanos on butterflies in particular van Duinen postulates that n deposition induces a nutritional imbalance leading to starvation)*	We agree with this point. The reason lichens (which are lichenized fungi) were chosen to quantify the critical loads and levels was made clearer in the text. Lichens are completely dependent on the atmosphere both for nutrients and water supply. For this reason they are commonly used to monitor the effects of atmospheric pollution, and were expected to respond directly to airborne N in our study. In fact, lichen functional diversity changes could be nearly all (90%) explained by atmospheric ammonia concentrations. We would expect some response on soil invertebrates or fungi, not excluding a higher sensitivity, but that response could be mediated/ influenced by soil characteristics such as the initial pH. Thus we expect that soil response to N addition depends on more variables. Measuring the atmosphere is more direct. Of course that measuring the impact of N on soil is important but it will be difficult to be universalize since it depend on initial local environmental conditions. The same is true for butterflies, not excluding a higher sensitivity their response is mediated by other factors such as plant conditions and diversity. Thus, because lichens respond directly to atmospheric alterations, they are more likely to be universal indicators for the impact of airborne N, and ideal tools to establish its thresholds.
2	*Line 12-15 needs complete re-writing*	In agreement, most of the abstract have been changed for clarity and correction of errors.
3	*Line 2 and throughout: question should it by nitrophytic or nitrophilic?*	These terms are commonly used in literature as synonyms, referring to species that tolerate/are promoted by nitrogen or even eutrophication. However, the preference of most papers in literature was “nitrophytic lichens”, so that was our choice.
4	*Note that the faster growth rates of bryophytes means that they respond more quickly to n inputs. Also note that macrofungi are also very sensitive to n-deposition (Koyode and Wu) and that VDI (German engineers!) have also produced standardised sampling method and how does this compare?*	We specifically say that lichen and bryophytes seem equally sensitive to excessive N and no statement is made on the most sensitive indicator. We do not exclude the possibility that other organisms are equally or more sensitive than lichens; only that lichens are by far more abundant in the Mediterranean tree trunks. And that is critical for using a standard (thus comparable) sampling method: tree trunks are much more comparable than any other substrate (e.g. soil or rocks).Our text only implies that we can find much more epiphytes lichens than epiphyte bryophytes in Mediterranean areas, as most bryophytes are excluded from the main trunk due to the drought environment. On this topic, the method used for sampling lichen diversity in our paper (so called “European method”) is in fact a method developed taking the VDI method as the basis. Currently an improved version of this method is being submitted to the VDI in order to make it a standard.

5	"Animals' emissions were calculated using European emission factors (EEA, 2007) assumming an constant barn ocuppation of 200 animals" *and is this the correct thing to do?*	We think it is correct. Our aim was to calculate the long-term critical levels and loads, for which large time periods must be taken into account. Therefore, although minor changes on cattle numbers may have occur weekly, both the nitrogen deposition and atmospheric ammonia concentration were averaged for one year (although shorter periods were available). Thus considering an average cattle number is correct. This has been clarified on the text, replacing constant by average, which is more correct. European emission factors were used for this in absence of specific values for Portuguese livestock.
6	*The evidence that trees filter out the n is strong.*	We agree with this point, but that was taken into consideration when modelling N-deposition, that assumed higher deposition on "trees" land-cover. In fact the model considered values for deposition velocity from the atmosphere to the "trees" of 0.036 ms^{-1} while deposition velocity to "grass" was set on 0.0045 ms^{-1}.
7	*We are given yearly data but no variation values (standard deviation?). Is it possible that the variation might be high and the impact shown is a response to the highest values rather than the mean?*	We tested individual time periods, maximum values, minimum values, etc; however, relations to lichen diversity were always more significant considering the average values.