We thank both reviewers and Yan Li for their time and effort and their helpful and constructive comments. The original comments of the reviewers and Yan Li are in color. Our reply is in black.

Comments Referee 1

The study's national level investigation into net radiative forcing of forest change is a great contribution to the field. The synthesis of different data sources is well thought out and well presented (especially the many assumptions required by such a synthesis). I greatly appreciated the inclusion of the sensitivity analysis.

My only requested revision of any weight is at page 10133 line 26 through page 10134 line 2. The authors state that "seasonal variation of the albedos of different land-use classes is very similar". Since the statement is in support of a central assumption of the methods, some values or a citation would be helpful.

This is indeed an important assumption. We added boxplots showing the seasonal trend of the four land use/land cover (LULC) classes "Forest", "Open Forest", "Intensively Used Open Land" and "Extensively Used Open Land". The trends are very similar. However, especially for snow-covered albedos there are also differences. For example the albedo of forest in April and May are increasing (in comparison to previous values), while the albedos of the three classes "Open Forest", "Intensively Used Open Land" and "Extensively Used Open Land" decrease in April and May.

There are mainly 2 reasons, why we decided to use average values and not differences for each month. First, the strongest seasonal trend is related to snow-cover, which we explicitly included (Zhou et al., 2003). Second, the use of seasonally varying albedo differences in snow-free and snow-covered albedo requires albedo data for every month. Since we calculated albedo values for small biogeographical regions and 4 specific LULC classes, there are sometimes only few or even missing albedo values for a certain month/LULC class/biogeographical region (e.g. for snow-covered albedos in September/October and May/June). Using seasonally varying albedo differences it is necessary to interpolate and extrapolate albedo values for some months and accept bias when only few values are available (e.g. again for September/October and May/June). Inter- and extrapolating albedo values, we calculated the spatially explicit pattern of albedo RF again. Root mean square error was 4.3% and the pattern we found was mostly identical. Averaging the albedo values does not account for the seasonal trends in the albedo differences, however, it was a stable estimate reducing the effect of outliers and assumptions needed to inter- and extrapolate albedo values.

We adapted the paragraph in the discussion paper:

"The albedo was estimated using the following equation (modified from Barnes and Roy, 2010, Roesch et al., 2002):

$$\Delta\alpha(t) = f(t)\,\Delta\alpha_s + (1 - f(t))\,\Delta\alpha_v \qquad (1)$$

, where Δα(t) is the monthly albedo-difference between two LULC classes, Δαs the average albedo difference between two LULC classes when snow-covered, Δαv the average albedo difference between two LULC classes when snow-free and f(t) the fraction of snow-cover per month. We used average albedo differences of snow-free and snow-covered albedo differences and not monthly differences because of two reasons. First, the strongest seasonal trend is related to the presence of snow, which we explicitly included (Zhou et al., 2003). Second, in some months, reliable albedo data was missing and we considered the average to be a robust estimate. Since we found that the seasonal variation of the albedos of different LULC classes is similar, the averaging of snow-covered and snow-free albedo differences results in a fairly good approximation (Appendix Figure 2, Appendix Figure 3)."

A few minor corrections: Page 10126 line 11 - The text reads "BIOGEOPHYSICAL processes tend to counter the BIOGEOPHYSICAL effect". Should one of the "biogeophysical"s be "biogeochemical"?
Page 10126 line 21 - as above "between BIOGEOPHYSICAL (mainly albedo) and BIOGEOPHYSICAL effects"

We changed the second biogeophysical to biogeochemical in both cases.

Page 10130 line 14 - Clarification needed, "and that of needles/leaves on (Perruchoud et al., 1999)." Were the authors intending the this to read: "needles/leaves is based on Perruchoud et al. (1999)."

Yes, it should be "needles/leaves is based on Perruchoud et al. (1999)."

Figures added to the appendix:

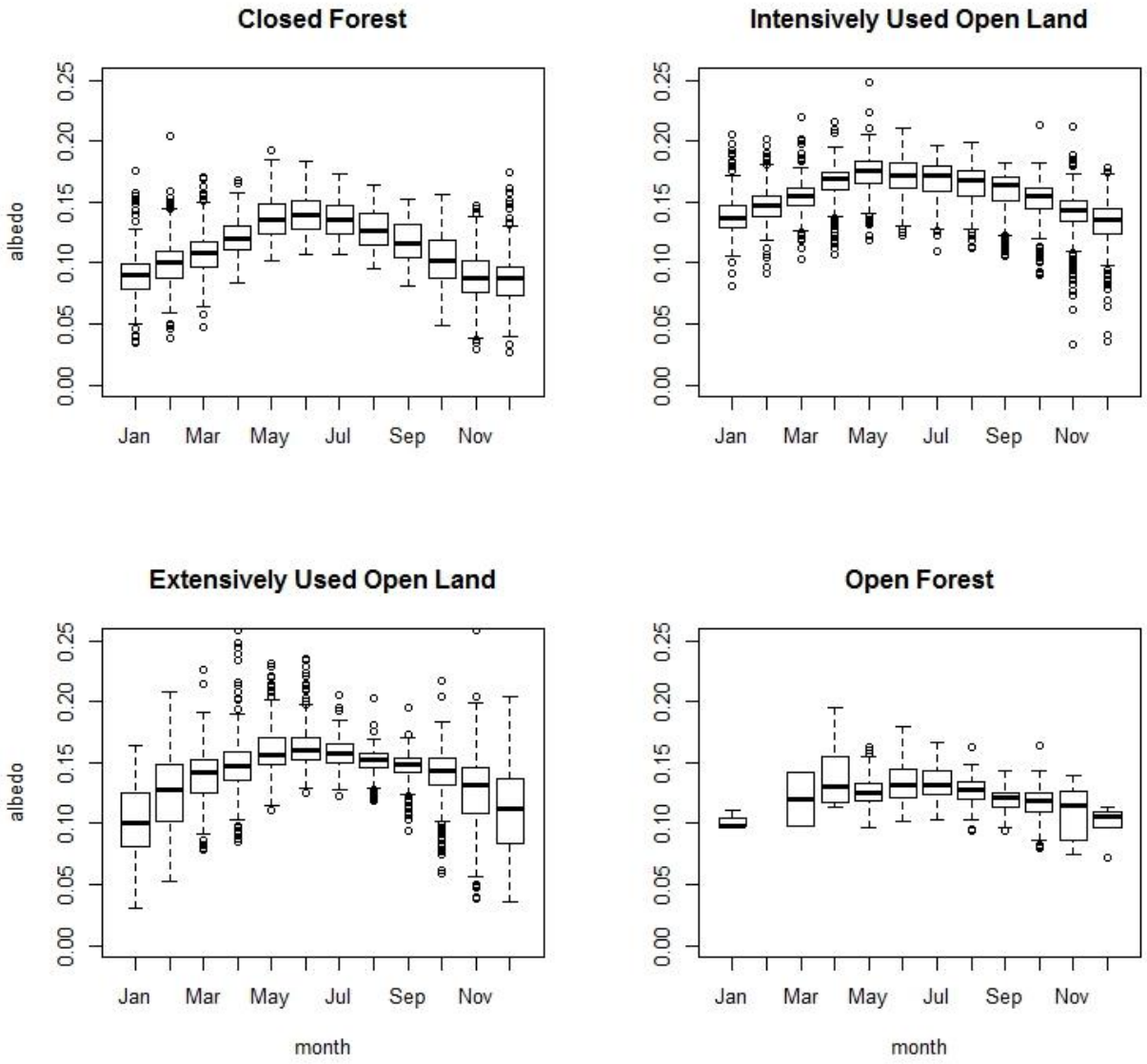

Figure 2: Seasonal variation of albedo values of the four snow-free LULC classes Closed Forest, Intensively Used Open Land, Extensively Used Open Land and Open Forest (only full BRDF inversion albedo values).

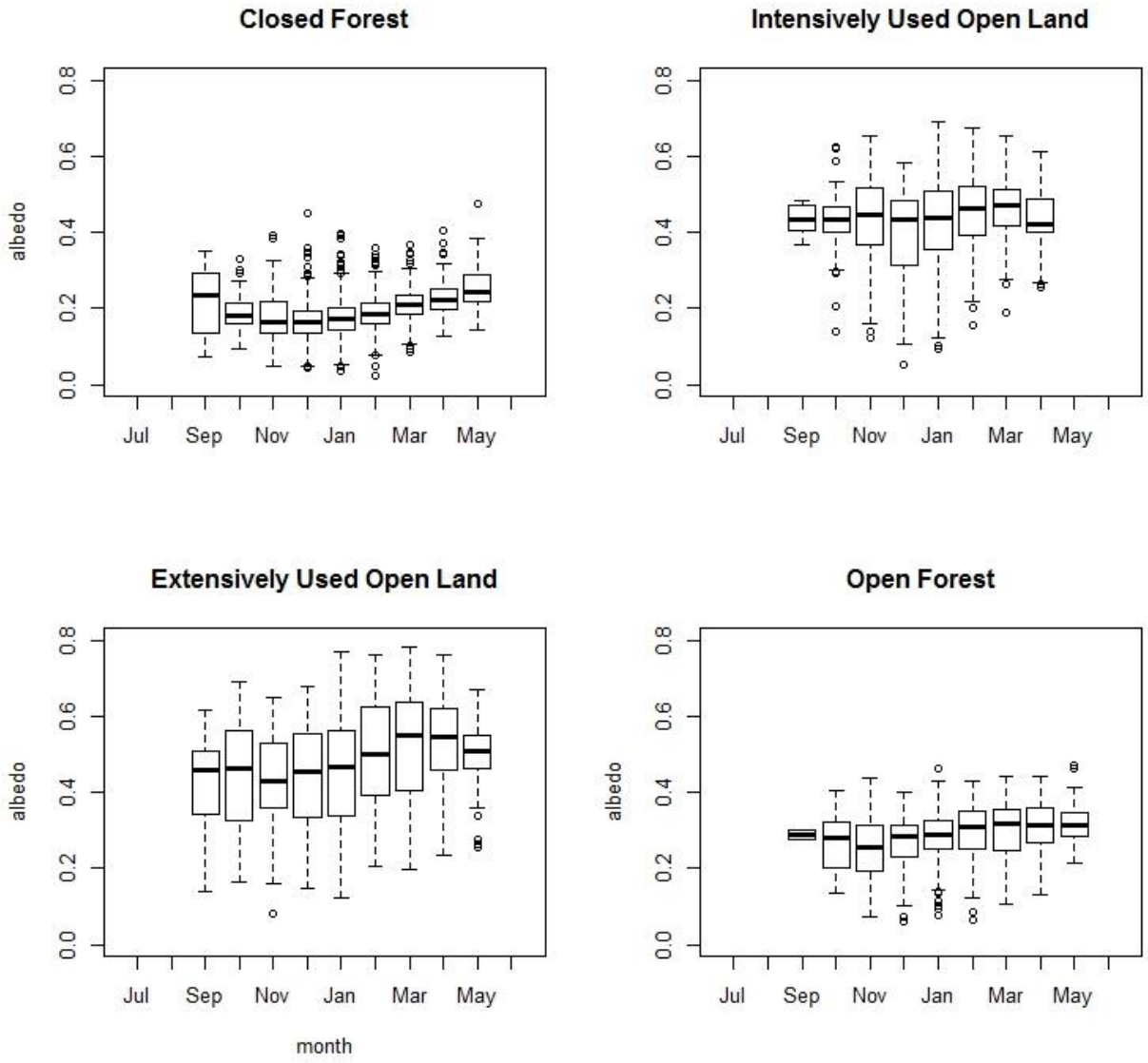

Figure 3: Seasonal variation of the albedo values of the four snow-covered LULC classes Closed Forest, Intensively Used Open Land, Extensively Used Open Land and Open Forest (full BRDF and magnitude inversion albedo values).

BARNES, C. A. & ROY, D. P. 2010. Radiative forcing over the conterminous United States due to contemporary land cover land use change and sensitivity to snow and interannual albedo variability. *Journal of Geophysical Research-Biogeosciences,* 115.

ROESCH, A., WILD, M., PINKER, R. & OHMURA, A. 2002. Comparison of spectral surface albedos and their impact on the general circulation model simulated surface climate. *Journal of Geophysical Research,* 107**,** ACL13-1-ACL13-ACL13-18ACL13-ACL13-18.

ZHOU, L., DICKINSON, R. E., TIAN, Y., ZENG, X., DAI, Y., YANG, Z. L., SCHAAF, C. B., GAO, F., JIN, Y., STRAHLER, A., MYNENI, R. B., YU, H., WU, W. & SHAIKH, M. 2003. Comparison of seasonal and spatial variations of albedos from Moderate-Resolution Imaging Spectroradiometer (MODIS) and Common Land Model. *Journal of Geophysical Research-Atmospheres,* 108.