Author's response:

Thank you for your comments. The manuscript is motivated including references to recent studies illustrating the limitations of passive remote sensing of optical thin cirrus. These limitations mark the problem and focus the paper is dealing with. Furthermore, after revising the manuscript the statement of the problem as well as the motivation is strengthened by implementing extended references, further discussion of the problem and an improved organization of the manuscript justifying a study dealing with the mentioned limitations.

Basically, the manuscript presents the impact of surface reflected radiation on passive remote optical property (optical thickness, effective radius) retrievals to estimate variations caused by the surface albedo. Additionally, as the manuscript is dealing with thin cirrus, other possible influencing factors are investigated, named the ice crystal shape as well as the BRDF to evaluate the influence of surface albedo variability in comparison. This also includes the change of heterogeneity to variability in the title, to prevent readers from false impressions as mentioned in your comments. Referring to your two suggestions, a sub-pixel investigation (point one) is not given in the manuscript as the spatial resolution of the reflectance measurements is not high enough, which is mentioned in the manuscript. The necessity of 3D radiative transfer calculations is already mentioned as concluding statement. However, as the investigated cases feature homogeneous cirrus instead of highly scattered situations 1D calculation is a feasible method for the investigations presented in the manuscript. The direct relationship between the variation of surface albedo and the variation of the retrieval parameters is now discussed more deeply after revising the manuscript. This includes next to an extended discussion an implementation of further retrievals using different approaches of surface albedo variability. The existing retrieval approach using a frequency distribution is enhanced by a second approach using a second frequency distribution considering a larger area. This way, possible influences of enhanced variability are quantified. Next to that, two retrieval approaches without using frequency distributions illustrate differences and variabilities to the frequency distribution approaches in general. For these methods the mean of the surface albedo as well as a "direct allocated" surface albedo based on a 10 km² footprint below the plane is used. This enhanced study of the variability illustrates the influence of the surface albedo to the retrieved optical properties in a broadened way for the cases investigated here.

This may also improve the mentioned problem relating the method. By presenting and discussion of extended systematical calculation results the measurement cases can be verified and connected on afterwards.

In combination with a strengthened motivation this would prevent the issues mentioned in your comment.