Review of 'Evaluating the representation of Arctic Cirrus Solar Radiative Effects in the IFS with Airborne Measurements ' by Röttenbacher et al.

This study leverages the HALO campaign airborne dataset to evaluate the representation of the solar radiative effects of Arctic cirrus clouds during two case studies in the Integrated Forecast System.
The ecRad radiative transfer scheme is used and sensitivity tests are performed regarding the choice of the ice optics parameterization.
After the evaluation of radiative fluxes and ice crystal properties with respect to radiation observation and lidar-radar retrievals, the paper concludes that the discrepancies between simulaed and observed irradiances are mainly due to the mismatch between observed and simulated ice crystal effective radius.

The paper is overall well written, the methodology is sound, the analysis careful and accurate and the results relevant for global and polar climate modelers. I think the paper can be published in ACP after some revision work following suggestions below.

Major comments :

- I am missing something at the end of the paper regarding the conclusions about the reff parameterization, and more particularly the Sun et al. parameterization.
  The paper provides a lot of context in the Introduction (line 61-80) and clearly shows that reff is the culprit of the story. However, as a polar climate modeler, I would be happy to have a suggestion on how to change the original parameterization to make it more 'arctic suitable'. Even though deriving a new reff parameterization is not the main aim of the study, and even though the paper considers only two study cases, I sincerely think this aspect should be tackled (at least a first try) in the paper.
  I would suggest the authors to complement their study with an additional section discussing more in details the performance of - and possible adaptations to - the Sun et al. parameterization for reff. This section might include :
  - an assessment of the reff prediction removing the cosine dependency upon latitude ;
  - a comparison between observed and predicted (by the parameterization) reff values using the observed temperature and IWC as inputs ;
  - a derivation and evaluation of a new reff=f(iwc,T) function from in situ data and a comparison with the original parameterization

- Although they are optically quite thin, I would really appreciate to see a satellite image (infrared and/or visible channels) of the two cirrus clouds studied. This would make it possible to better characterize the horizontal size of the clouds as well as to better visualize which part of the cloud have been sampled by dropsondes. This is quite important since IFS fails in capturing the supersaturation within the cloud.

Minor comments :

l26 : ‘exhibits specific dependencies on the high gradients of surface albedo’ : not clear, please rephrase.
L141 : ‘ecRad cloud free simulations’ : please provide more details about the simulations setup.
L160 : ‘to parameterize 3D radiative effects’ : all 3D radiative effects or only trapping ?
L163 : So what is ths spectral resolution ?
L169 : length scale : horizontal resolution ?
L198 : Can you be more explicit on which albedo value is used for each of the ecRad band ?
L206 : Although you mention them in the Introduction, please recall here the output quantities of the ice optics parameterization.
L265 : Could this be due to the fact that IFS does not predict a cloud fraction associated with precipitating ice. What I mean here is that can the model simulates precipitating ice (snow category) in meshes where cloud fraction is 0 ?
L415 : Please provide Pangaea links for BACARDI, HAMP and dropsonde data.