

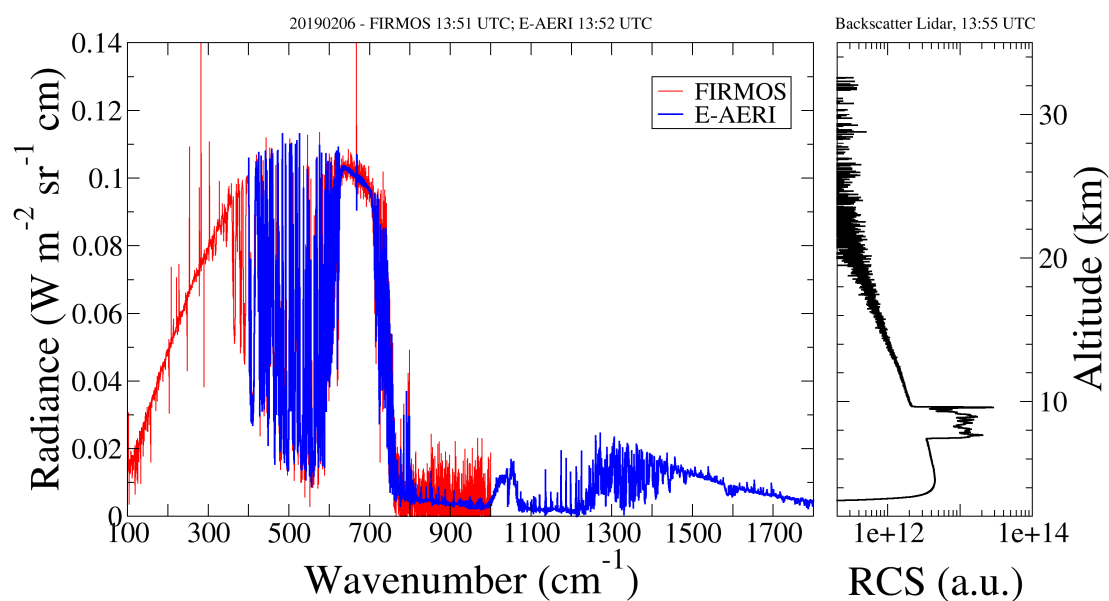
Reply to Referee comment *essd-2020-377-RC2*

We thank the reviewer for the positive comments and the suggested minor corrections, which are all implemented in the revised text.

Concerning the comment on “how the dataset can be used to constrain radiative properties of ... cirrus ice particles, and snow/ice emissivity”, we will improve the text in the revised paper by adding the following information.

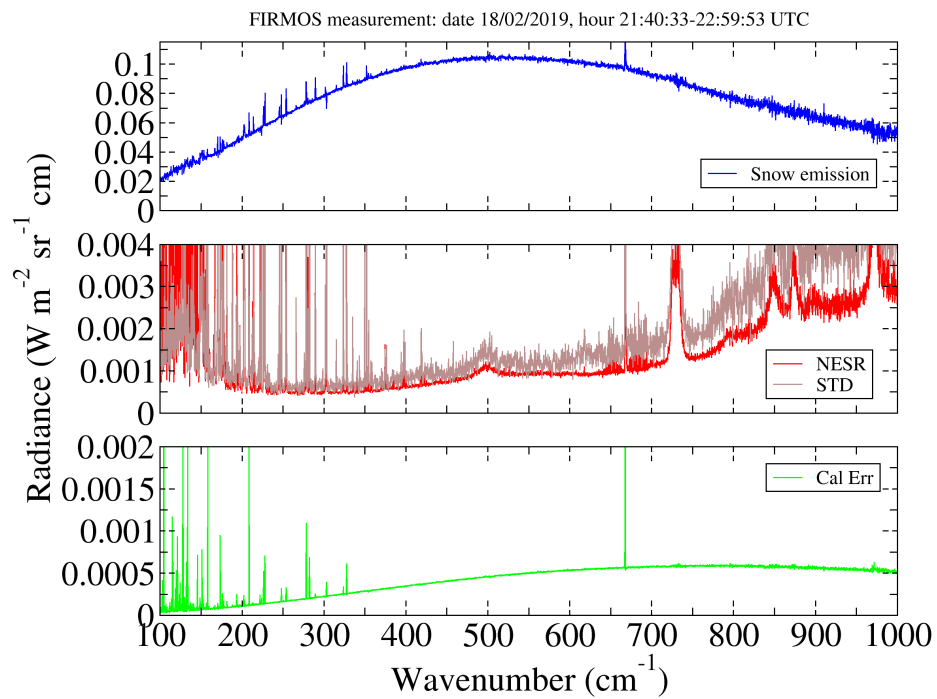
Lidar measurements can be used to retrieve cirrus properties such as cloud geometry (cloud bottom and top heights), extinction profile, and optical depth which provide, together with vertical soundings of humidity and temperature, a full characterisation of the atmospheric state that can be used to check and refine radiative models of water vapour spectroscopy and cirrus ice-particle properties in the FIR and to explore the effect on the retrieval performance of cirrus micro-physics as shown in Di Natale et al., 2020, DOI: 10.3390/rs12213574.

An example of spectral measurements in presence of the cirrus cloud, as shown in figure below, will be added to the revised text.



Comparison of FIRMOS and E-AERI spectra acquired in presence of a cirrus cloud on 6 February 2019 at 13:51 UTC and the corresponding lidar RCS profile.

Furthermore, the example of snow measurement of the figure below will also be added as an additional panel in Fig. 5.



Concerning the comment on page 75, only the first channel of E-AERI is used for this work. The value of 3.3 microns refers to the second channel of E-AERI and was erroneously used in the text instead of the corrected value of 5.56 micron (1800 cm⁻¹) of the first channel. This mistake will be corrected in the revised paper.

Finally, all the suggested minor corrections will be done in the revised paper.