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Comment

## ***Interactive comment on “Mid-latitude cirrus classification at Rome Tor Vergata through a multi-channel Raman–Mie–Rayleigh lidar” by D. Dionisi et al.***

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Minor:

#1 - The 167 cirrus cases are defined on the basis of discontinuity point analysis that identifies in each lidar measurements quasi-stationary temporal period (QSTP) conditions (see section 2.2). These periods are independent in terms of statistical variability. Considering that a typical a typical nighttime lidar session at Rome Tor Vergata is of around 4/5 hours during the summer and 7/8 hours during the winter, several QSTPs are identified for one lidar session that, in turns, means that it is possible to have more

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than one cirrus per lidar session. New text added in section 2.2: ‘The QSTP methodology guarantees that the revealed cirrus clouds are independent in terms of statistical variability.’

#2 - We don't understand this point. The occurrence of all types of measured cirrus was included in the analysis. In particular, as reported in Table 3 of the manuscript, two classes of thin cirrus have been identified (class I and class III) with an absolute occurrence of 5% and 9%, respectively.

Major:

#1 - We agree with the reviewer, the seasonality of cirrus occurrence is an important element to understand the cirrus origin and formation. Although this analysis has been performed, the obtained results are not significant and have not been included in the manuscript. In fact, lidar measurements are, in principle, performed 1 times per week, but the arising of several factors (e. g. lidar maintenance, lack of man power, weather condition, vacation) did not permit to acquire an homogenous and statistically significant dataset to derive cirrus seasonality.

#2 - The next planned step of this study will be to select and characterize in detail the meteorological condition of several cirrus cases with the objective of relating each class to one or more processes controlling cirrus formation and evolution. However a preliminary analysis of some meteorological parameters have been added in section 3.2.2 to characterize cirrus classes. In particular the mean profiles of RH, of the zonal and of the meridional components of the wind have been derived from radiosonde data for each cirrus class. The results, resumed in the new figure (Figure 7) of the section 3.2.2, confirm that dedicated studies are needed to further investigate the attribution and origin of cirrus classes. For the added section 3.2.2, please see the revised discussion paper, added as a supplement file.

#3 - We don't understand this point. As written in the reply to comment #1, all types of cirrus are treated in the cluster analysis. Laminar cirrus and cirrus near or crossed the

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tropopause belong to class III, while contrails could be probably related to class I.

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