Anonymous referee #2

We thank the referee for the useful comments. We have attempted to address each below.

1. We do not follow a particular protocol. As explain in p6382 line 2, the Rayleigh-Mie-Raman (RMR) lidar at the OHP makes measurements during nighttime throughout the year and clear weather. Usually lidar acquisitions are made 3-4 times per week. Time acquisition is around 6 hours typically and depends on factors such as local cloud cover evolution and availability of the operator. These details have been added in the manuscript.

2. Done. "…Recent studies of cloud optical properties have shown the LR frequency distribution is centered at 25±15sr for ice clouds…."

3. The section 4.1 focuses on the cirrus clouds classification and the methodology used. Concerning the association of the mechanism which leads to the formation of the different classes, as exposed in Section 6 (Summary and discussion), it is difficult to infer from our results the origin of cirrus clouds classes. Some studies (Keckhut et al., 2005, Montoux et al., 2010) have shown thin cirrus in upper troposphere are associated with moist air masses coming from subtropical regions and numerical simulations using an isentropic transport model were able to reproduce these clouds. Cirrus from the second class probably come from more "standard" meteorological phenomena, of larger scales associated with relatively fast ascension of warm air mass due to frontogenese processes. Finally, cirrus from the third class could originate from contrails formed by aircrafts. Lamquin et al. (2012) report that such clouds could be expected over Europe around 250hPa mainly because this area is frequently saturated with respect to ice. The thickness of these observed clouds and the altitude of saturated air let us think that this 3rd class could be associated to old contrails turned into cirrus clouds. However, further studies are required to confirm attribution assumptions. We plan to investigate the origin of these classes in another study.

4. Details about measurements protocol have been added on Section 2.1. Regular measurements performed over the time (month, year) from the OHP ground-based lidar had permit to obtain a cirrus clouds database relatively homogeneous, and thus allow addressing occurrence aspects. See answer n°1.

5. We did not examine the reason of the CT increase and actually we do not have suggestion about a physical mechanism which could explain these trends. We will further investigate these aspects in another study.