

This study presents a thorough discussion on the chemical composition of PM<sub>10</sub> at Col Margherita. The datasets and analysis are robust and provide valuable insights for high-altitude background sites. The source apportionment results are interesting, as mass trajectories from different regions have distinct chemical characteristics. The manuscript can be further improved in the following aspects:

1. The abstract only included the meaning of the study and the method. The main conclusions were not mentioned.
2. It seems only ~30 compounds were used in the PMF analysis, despite that ~100 is measured. What's the reason? What would happen like if all the measured species are included?
3. Figure 13, the PMF results only show contributions from primary sources and are mostly transported from other regions, are there secondary sources or background aerosols?
4. Section 3.2 provides too many details and some may not be relevant to the main conclusions of the manuscript, these parts can go to the supplementary information. For instance, Figure 7-11 provides too many information on the trace elements and it distract the readers a lot.
5. Line 468, the traffic/refinery and oil combustion process are not recognized in PMF. Please discuss the reasons.

Other minor comments:

1. Line 57-62 was duplicated with Line 165-173.
2. Line 94: what instrument is used to analyze the organic compounds?
3. The definition of periods are obscure, please define in the method which month are regarded as "spring", "summer", "autumn", "winter", "the seasons without snow cover", "the snow season", "the cold period".
4. Figure 2, what is "CA", why it increases in Spring and Summer?
5. Line 161-162 please give a brief preview here of what might be missing in December and January, and mention the exact section that discuss this in detail. It's hard for the readers to search for the clues in the long discussion part.
6. Line 173, please give a brief ratio of the concentration measured by the two methods.
7. Line 266-268 The logic here is hard to understand. Authors say that the two acids are from  $\alpha$ -pinene, then they say its poorly understood? And the following examples in Line 268-230 should provide specific conclusions of the two studies.