Comment on acp-2021-790

Anonymous Referee #1

Referee comment on "A novel method of identifying and analysing oil smoke plumes based on MODIS and CALIPSO satellite data" by Alexandru Mereuță et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-790-RC1, 2022

The paper "A novel method of identifying and analysing oil smoke plumes based on synergic satellite data" presents an interesting methodology to study oil smoke plumes from combined satellite measurements from MODIS and CALIPSO. As stated in the paper, the analysis of this events is of scientific relevance and frequently is not possible to obtain ground-based accurate measurements. Therefore, the satellite approach might be of high interest. However, it needs to undergo a major revision before its publication in ACP.

General comments:

The paper needs an extensive language revision. It is necessary to check the writing, grammar and typos.

It is necessary to reduce the length of the paper, especially the results section. There are too many study cases analyzed in detail, but the main conclusions of the different analysis get lost in the text and are not clear. The number of figures should also be reduced. According to this comment, it is also necessary to improve the last part of the abstract. The authors provide a large list of numeric values, but it is not clear the message and conclusions that we can infer from these data.

The methodology section is also quite long and confusing. It will be useful to use one of the cases as an example to illustrate the methodology.

From Sections 3.4 and 4, it is concluded that there is no agreement between the different approaches and even with the literature. Even though the differences are explained, how can you validate the method you propose in this paper? What is your reference? In this

section, it is necessary to include the uncertainties in order to make the comparison.

Why didn't you use SSA? The analysis of the SSA (or the AAOD) will add a great value to the study since one of the interests of studying smoke lies on its absorbing capacity. Data from a different sensor, such as OMI, could be of interest.

Specific comments:

Line 265: What is the information obtained from the analysis of the unsuccessful retrievals? It is useful for the study or even reliable?

Tables 2, 3, 4 and 5: A column with the name of the oil fires will make them easier to identify in the tables.

Figure 3: Use the same scale for the AOD to ease the comparison among the different figures (this comment can be applied to all the figures)

Line 385: You indicate that "This is evident in the plume albedo from MODIS true colour images.", but the RGB images are not included. Include them or rephrase the sentence.

Line 507: In figure 7b there are no data below 3150 m, how do you identify the plume base and top?

Line 553: What does imply for this study that the SIBYL algorithm failed to detect the plume area and level 2 products averaged 20 km were used? Is the information obtained accurate for the study of the smoke plume?