

General Comments:

The study “Quantifying particulate matter optical properties and flow rate in industrial stack plumes from PRISMA hyperspectral imager” by Calassou et al. addresses the issue of industrial stacks plumes retrieval by means of PRISMA satellite data. The topic is scientifically relevant and the paper is well structured and written. Thus, I recommend the manuscript for publication after addressing the following points and clarifications.

- 1- Is it the first time that PRISMA data have been used for this type of research? If yes it would be valuable to highlight that, if not you should provide references in literature.
- 2- Have you checked if other studies on the same test sites have been conducted in literature?
- 3- Have you considered the issue of clouds influence? Are the images you’ve taken into account (both PRISMA and L2/MSI) free of clouds?
- 4- Have you considered the possibility to provide an independent validation of the presented results? Maybe with existent satellite products/derived satellite products/other ground truth sources; in line 354-357 you mention that the validation with in situ measurements remains virtually impossible. Have you investigated if there are satellite products that provide the same parameters you estimated?

Specific Comments:

- Line 100: do you mean only detection or also retrieval?
- Eq.1 -> Is there a reference in literature?
- Eq.2 -> Is there a reference in literature?
- Line 128: Is there a reference in literature to the COMANCHE software?
- Eq.3 -> Is there a reference in literature? -> Could you clarify why there is no direct component of the solar irradiance related to δ ?
- Line 165: “the uncertainties due to the water vapor concentration are empirically fixed to 10%” -> Is there a reference in literature for the uncertainty due to the water vapor concentration?
- Line 166: “the uncertainties of the background aerosol visibility is set to 5 km” -> -> Is there a reference in literature for the uncertainty of the background aerosol visibility?
- Line 227: LM acronym has not been defined previously.
- Line 236: “the combined plume mask based on DOF and iteration number (Figure 5c)” -> Could you clarify how DOF and iteration number are combined to get the plume mask (ex.: “pixels corresponding to DOF threshold of ... and/or? pixels corresponding to number iteration of ... are taken into account...”)
- Caption of Figure 5: OEM acronym has not been defined previously.
- Line 238: “The initial value of AOT is set to 0.5 with an uncertainty of 1.0. The retrieved AOT map (Figure 6a) reflects[...]” -> Could you mention/briefly recall the process to retrieve the parameters in Figure 6 (how to obtain Figure 6 from Figure 5 basically). Is the process mentioned in line 192-193 (“The aerosol optical properties are simulated using the MOPSMAP T-matrix algorithm (Gasteiger and Wiegner, 2018)”)?
- Line 256: “The median radius of the accumulation mode is on average equal to $0.11 \pm 0.02 \mu\text{m}$ in the pixels present in the plume mask.” -> The plume mask (as well as the DOF and Number

of iterations) have been shown only for case 1 (Gas flaring, Fig. 5), I suppose the procedure is exactly the same for all the sites, is that correct?

- Line 262-263: “The partial detection can be due to a poor reconstruction of the vegetated soils[...]” -> May be the partial detection caused also by the fact that the plume may be less thick/more dispersed in that areas?
- Line 263-264: “Further downstream, an artifact due to the sunglint on a water retention bassin can observed” -> Where the artifact/water retention bassin is located in the map?
- Figure 8: May the point B be a false positive?
- Line 290-291: “The relative error on the surface reflectance reaches 60% at 550nm for this particular cases” -> Could you specify which case? In the previous sentence the coal-fired plant has been mentioned while from Figure 10 it seems that the flaring site exhibits a relative error of 60% at 550nm. Could you clarify that and check the correspondence between text and Figure 10 from 285 to 291 lines?
- Line 292: “The error associated to the surface reflectance estimation and to the aerosol properties retrieval process”-> Could you provide a reference in the text on where in the manuscript the error associated with the aerosol properties retrieval process is computed? Is the 3.3 section?
- Line 330: “There are several limitations (low revisit time, cloud cover, ...)”-> Could you specify limitations of the “applicability of the proposed framework to monitor the air quality around the facilities”

Technical Comments:

- Line 26: stationnary -> stationary
- Line 30: developped -> developed
- Line 47: impletation -> implementation
- Line 50: betwen -> between
- Line 116: space after the point “[...] m²).For a flat, [...]”
- Line 165: visibily -> visibility?
- Line 271: “The radius is equal to 0.20 μm ” -> Do you mean the radius of the point B? Could you specify?
- Line 290: “dractic”->drastic
- Line 302: “contribution contribution”-> contribution
- Line 311:” dominated by the error on large error”-> Could you review this part of the sentence?