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Atmospheric Measurement Techniques Discussions

Interactive comment on "The Airborne ROmanian Measurements of Aerosols and Trace gases (AROMAT) campaigns" *by* Alexis Merlaud et al.

Anonymous Referee #2

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The manuscript titled The Air borne Romanian Measurements of Aerosols and Trace gases(AROMAT) campaigns at two areas provides relevance of each instrument for validation of air quality satellite (e.g., TROPOMI) products. The paper identifies a signiïňĄcant source of comparison error(measurement time difference), which is a useful information for the satellite validation. It summaries DL, BIAS, measurement range of several trace gas species for each instrument. However, the paper misses detailed description of instrument characteristics and measurement geometry, data used for each instrument AMF and their effects of the retrieved products. There has been no analysis about horizontal and vertical representativeness of each instrument although the campaign is to aim for validation of TROPOMI. The manuscript needs to be improved considering those major issues.

Abstract and Introduction: The objectives of this present study and campaign needs to be clearly distinguished. The objectives of the campaign are described in Abstract as "Their main objectives were to test recently developed air borne observation systems dedicated to air quality studies and to verify the concept of such campaigns in support of the validation of space borne atmospheric missions such as the TROPOspheric5 Monitoring Instrument (TROPOMI)/Sentinel-5 Precursor (S5P)." However, there are differences between the objectives of the campaign and those of this present work. Please address the objectives of this present study in Abstract.

Line 218: ".The comparison reveals a good agreement when averaging the forward and backward-looking Mobile-DOAS NO2 VCDs, with a MPIC/AirMAP slope of 0.93 and a correlation coefïňĄcient of 0.94." One of the campaign objectives is to identify relevance and capability of each measurement type on ground or air borne platforms for validation of TROPOMI products. There are missing of both qualitative and quantitative causes for "slope (between ground based MPIC mobile DOAS and AirMAP) of 0.93 and a correlation coefïňĄcient of 0.94". Line 224: I do not understand how "the NO2 vmr measured at 300 m a.s.l. can be used as a proxy for the NO2 VCD". Please describe how it can be used used as a proxy for the NO2 VCD. Please also use capital letter for VMR rather than vmr.

Line255-260: In comparisons between data of airborne AIRMAP, SWING, and ground based Mobile DOAS, it is important to explain if they measure the same target in terms of horizontal and vertical coverage. -If each instrument measures a target (in particular plume) at different geometry and location, there should be large differences between the retrieved NO2 VCDs. Authors need to explain reasons that cause such differences in terms of the algorithms, measurement geometries, effect of platforms, etc., in detail. -In the paper, a difference between mobile DOAS and those of airborne is partly related to air mass uncertainties. There is absence of description of NO2 AMFs for mobile DOAS and those for AirMAP and SWING. What are the input data used to calculate each AMF?

-please add schematic graph which shows instrument setup and measurement geometry (including measurement azimuth angles for target locations such as location of plume) of each instrument

Line 300: There are many sentences which mention “reference measurements”. Please define “reference measurements”

Line 304: What are “typical air mass factors (AMF) used here for each species and what are the references for each AMF value for each species for each instrument?

Line 394: Please address the definition of “combined uncertainty” including how “combined uncertainty” has been calculated.

Throughout the figures tables, there no quantitative comparisons between various measurement data which were carried out at the same or similar time in the same site. Please consider adding the plots with analysis or address the reasons for not doing that.

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