

# Report on the outcomes of a Virtual Mobility<sup>1</sup>

Action number: CA21119

Grantee name: Akriti Masoom

## Virtual Mobility Details

Title: Analysis of the past photometry campaigns, literature study, data analysis and report writing

Start and end date: 04/10/2023 to 14/10/2023

## Description of the work carried out during the VM

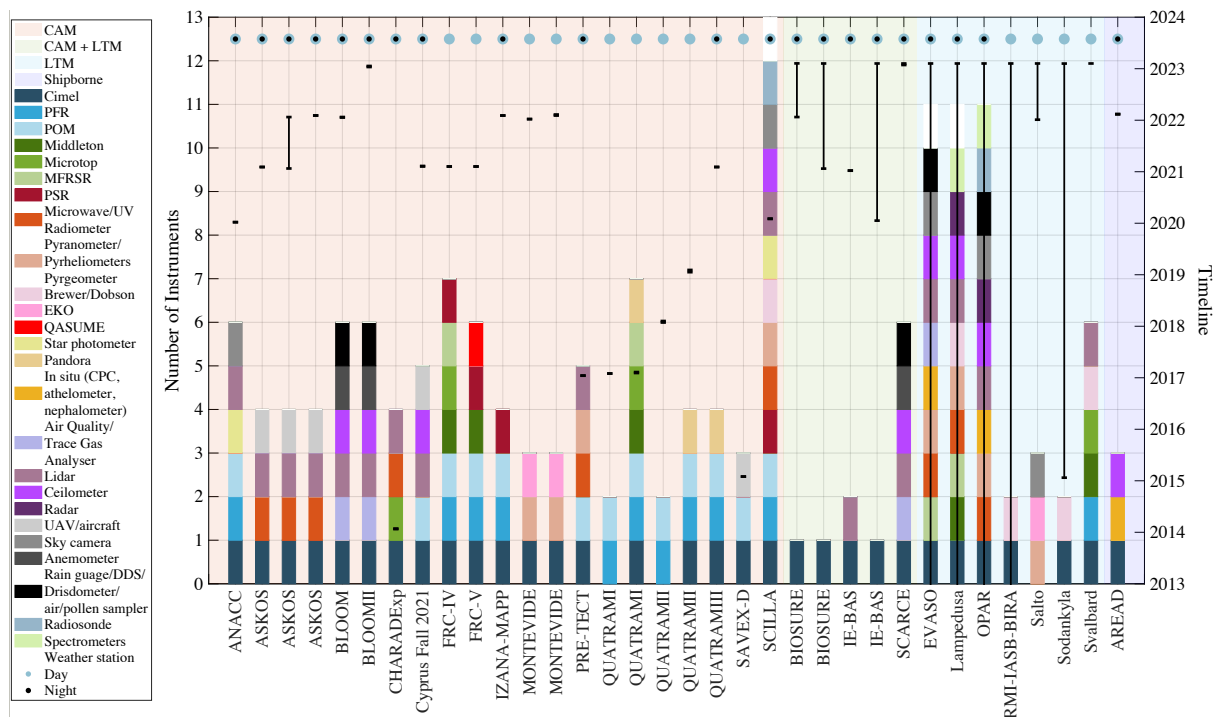


Figure 1: Overview of campaigns (CAM) and long-term measurements (LTM)

(i) Graphical representation of data collected during the first year of HARMONIA (2022-2023) is presented in Figure 1 which includes the campaigns, long-term measurements, instruments, timeline and

<sup>1</sup> This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

type of measurements (day/night/continuous). Similar analysis was done for datasets as presented in Figure 2 and simplified tabular representation of google sheet is prepared for WG1 deliverable report.

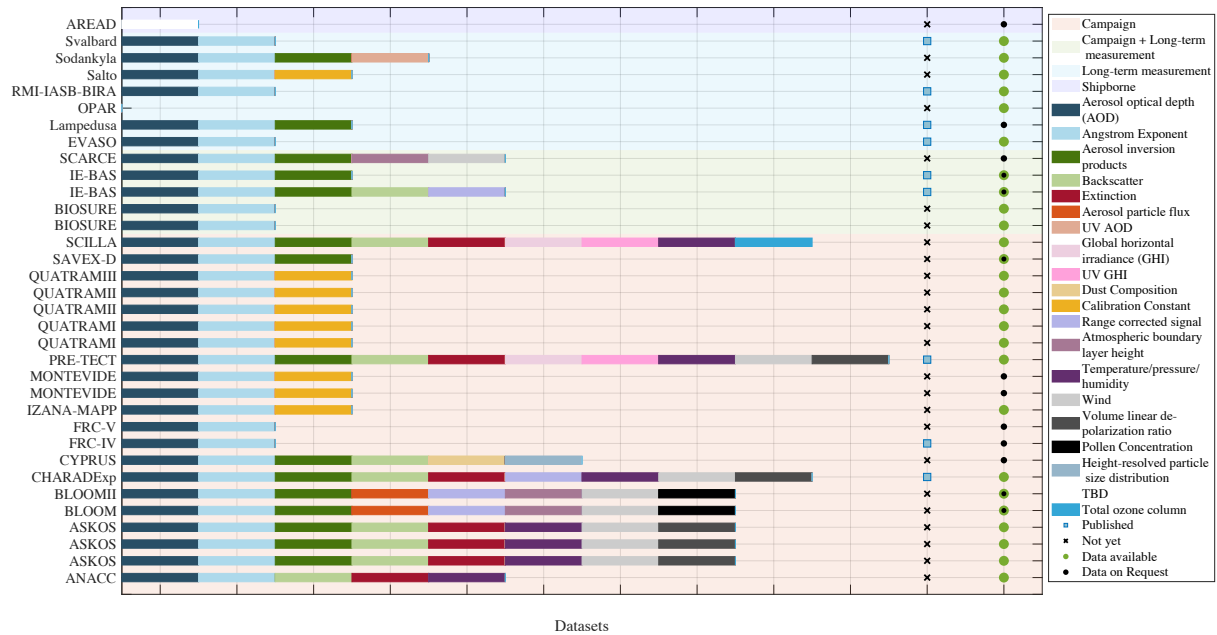


Figure 2: Description of dataset

(ii) Contributed to WG1 report writing and editing

(iii) Overview and Literature analysis of Filter Radiometer Comparisons (FRC)

FRC-IV was held from 28 September and 16 October 2015 in Davos, Switzerland. 30 instruments including filter radiometers and spectroradiometers took part from 12 countries including Precision Filter Radiometer (PFR), Cimel, POM, Multi-Filter Rotating Shadowband Radiometer (MFRSR), Precision Solar Spectroradiometer (PSR), SPO, SSIM and Microtops. The aerosol optical depth (AOD) retrieved from these instruments were compared at  $368 \pm 3$  nm,  $412 \pm 3$  nm,  $500 \pm 3$  nm and  $865 \pm 5$  nm to the reference triad based on the WMO criterion (95% of the data has to be within  $0.005 \pm 0.001$ /air mass). The number of instruments that achieved the goal of meeting the WMO criterion were found to be 24 (out of 29) at 865 nm and 500 nm, 13 (out of 21) at 412 nm and 12 (out of 17) at 368 nm. The comparison results were found to be the best corresponding to 500 nm followed by 867 nm while lower wavelengths (368nm and 412 nm) showed comparatively more deviations.

FRC-V was held from 27 September to 25 October 2021 (29 days) in Davos ( $46.82^\circ$  N,  $9.85^\circ$  E, 1590 m above sea level), Switzerland. The objective of the FRC-V campaign was to compare AOD and Ångström exponents (AE) derived from different instruments belonging to different global, regional, or national networks, to quantify the main factors that are responsible for possible deviations. The aim of the whole activity was to initiate action towards homogenization of the AOD measurements on a global scale. The comparison protocol was formulated according to WMO recommendations. Measurements of each instrument were compared to measurements taken by the WORCC PFR reference triad (hereafter referred to as the "WORCC PFR reference triad"). In total, 31 filter radiometers and spectroradiometers from 12 participating countries participated in this campaign including PFR, Cimel, Prede POM, SPO, PSR, QASUME and CW photometer. The AOD measurements from all the instruments were compared with the WORCC PFR reference triad at six wavelengths namely 368/380 nm, 400/412/440 nm, 500 nm, 675 nm, 862 nm and 1020 nm with the percentage of instruments with 95% agreement within the WMO limits being at least 68%, 82%, 91%, 90%, 100% and 85%, respectively. Furthermore, comparison of AE with the WORCC reference triad showed that 24 out of 29 instruments agreed within  $\pm 0.2$ .

The differences in AOD measurements between these instruments could be related to the uncertainties arising due to cloud filtering, air mass calculation, timing, calibrations, Rayleigh, ozone, NO<sub>2</sub> and other trace gases optical depths.

### **Description of the VM main achievements and planned follow-up activities**

The objective of creating a tabular and/or graphical analysis of the information collected in the google-sheet during the first phase of HARMONIA involving the list of more than 20 campaigns/experiments was achieved. Literature analysis of fourth and fifth filter radiometer campaigns (FRC-IV and FRC-V) was done. Contribution to the writing and editing of the HARMONIA Working Group 1 deliverable report for 2022-2023 is in progress and aimed to finish soon.

The outcomes of this VM contributes directly to the deliverable D1.1 of HARMONIA Working Group 1

D1.1. "Create a list of existing and foreseen campaigns or experiments needed for night and day aerosol measurements and report on the data collection and analysis of the data/measurements" of WG1 of COST action Harmonia.