

Report on the outcomes of a Virtual Mobility¹

Action number: CA21119

Grantee name: Roberto Román

Virtual Mobility Details

Title: EarthCARE validation activities at Baltanás (Spain).

Description of the work carried out during the VM

Description of the virtual collaboration and activities carried out during the VM, with focus on the work carried out by the grantee. Any deviations from the initial working plan shall also be described in this section.

(max. 500 words)

This VM has been successfully carried out. An optimal site was identified in the Baltanás village, the “Centro Cultural Polivalente” centre, which rooftop is flat and allows the installation of instrumentation with power supply access and data transfer. After the approval of the Baltanás administration, an AERONET sun/sky photometer (CE318-T from Cimel Electronique), an all-sky camera (OMEA-3C-TF from Alcor System) and a global pyranometer (SMP10-V from Kipp & Zonen) were installed in this rooftop, which horizon is mainly clear. These instruments are shown in the attached photos.

All the instruments were configured to send their data in near-real time, and to be shown in the next webpage: <https://goa.uva.es/baltanas/>. These measurements have been recorded in the framework of the second RACE-ECV campaign (Radiative Closure Experiments for EarthCARE Validation).

As was planned, several tasks have been carried out, including calibration procedures (such as the geometric calibration of the camera), data quality control, and routine maintenance and cleaning activities (every week), especially intensified in the days before the satellite overpass. In addition, an all-sky camera installed in Palencia, 20 km far away from Baltanás, has been also checked and cleaned before the overpasses, because it can be used to retrieve the cloud base height in the high-cloud cases. On overpass days, the measurement frequency has been increased to 1 min (30 seconds since May) in the all-sky camera images and to 5 seconds in the pyranometer global solar irradiance measurements. The measurement campaign has covered spring–summer 2026.

¹ 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 Grant Holder Manager to verify the grant documents compliance and proceed with the payment.



Figure: An AERONET CE318-T sun/sky/moon photometer (left), and an OMEA-3C-TF all-sky camera collocated with an SMP10-V global pyranometer (right), all of them in the rooftop of the “Centro Cultural Polivalente” centre of Baltanás (Palencia, Spain).

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

Description and assessment of whether the VM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the VM. Agreed plans for future follow-up collaborations shall also be described in this section.

(max. 500 words)

The measurement campaign has been a complete success. The covered cases during the EarthCARE overpasses have been very different between them, covering a huge variety of sky conditions with different aerosol loads and types: overcast, totally cloud-free, broken clouds with high cloud cover, partially covered by high clouds, and low clouds with low cloud cover. This is very interesting to study the performance of EarthCARE products under different conditions. It is specially relevant for the comparison of aerosol products derived from AERONET with the installed photometer and the retrieved by EarthCARE.

The planned follow-up activities after the generation of the valuable data, are to reconstruct the 3D cloud field during the EarthCARE overpasses using the all-sky camera images, in combination with the all-sky camera of Palencia for the high clouds' cases. These data will be used in combination with the aerosol information derived from the photometer, as input in a 3D radiative transfer model (MYSTIC/libRadtran) to calculate the global horizontal irradiance. These simulations will be compared against the pyranometer measurements and the EarthCARE product to quantify the effect of clouds in solar radiation and the accuracy of EarthCARE. All of this will be done in collaboration with the team proposed in the initial VM proposal.

The recorded measurements have been so successful that it has been planned to continue collecting them indefinitely, even after the VM action have officially ended. These measurements are of great interest to the wider atmospheric community, but specially to the HARMONIA community.

As mentioned in the original proposal, the achieved and future results perfectly fits with D3.3 HARMONIA deliverable: “Publish a white paper on sun-photometric aerosol accuracy and uncertainty for different applications”, since the comparison of EarthCARE aerosol products against the aerosol properties obtained from the Baltanás AERONET photometer can contribute to quantify the satellite accuracy. This aligns with the HARMONIA objective of identify and report the different networks’ retrieval uncertainties and assess the limitations on their use.