

MeLi Dos

Metrology for wearable light loggers and optical radiation dosimeters



Going forward

June 2024 – January 2025

This period has been eventful in its own way for MeLiDos, as all partners are finally getting started with device characterisation in WP1, data collection in WP2 and building a PoC in WP3.

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Update on device characterisation

Three different models of solar UV dosimeters and four models of wearable light loggers have been acquired and distributed among the partners. The process of determining suitable characterization methods is ongoing, with several ideas being tested.



Solar UV Dosimeters: Testing is being conducted on various parameters, including directional response, performance in measuring solar erythemal-weighted irradiance, linearity, and robustness. Challenges include variations in integration time and restricted access to real-time data. The first results were shared with collaborators at the midterm meeting in November 2024, leading to valuable feedback and discussions.

On the left, picture of UV logger characterization under the sky in Davos

Wearable Light Loggers: Initial testing has been conducted on spectral and directional response, linearity, and limit of detection, revealing significant differences between the models. Additionally, the influence of temperature and temporal light modulations (TLM) is being evaluated.

Next Steps: Once every characterization procedures have been tested, the most time- and cost-efficient ones will be selected for an interlaboratory comparison exercise. Each property will be evaluated by at least three laboratories.

Field data collection

Data collection started in the fall and will be completed by the beginning of summer 2025 by all partners. There is great collaboration between the partners for the transfer of experiences from field measurements, dosimeter use and survey procedures. Several stakeholders have also approached the Consortium to use or adapt the data collection protocol developed in the project and already [published](#).



Picture of the participants with the dosimeters

LightLogR featured by Euramet

We are delighted to see ever more interest in the software package [LightLogR](#) from research groups all around the world. Notably, the package nears publication in the Journal of Open Source Software (JOSS, [access the preprint here](#)). Also, we are preparing a major update that will bring solar-time-based functionality to the package- enabling powerful calculations and visualizations based on dusk, dawn, noon, etc. Look out for LightLogR 0.5.0 "Civil dawn" in the coming days! Finally, we would like to highlight one publication and three preprints depending heavily on LightLogR: [Power analysis for personal light exposure measurements and interventions](#) facilitates minimal sample size estimations for light exposure metrics based on historical data. [How to deal with darkness: Modelling and visualization of zero-inflated personal light exposure data on a logarithmic scale](#) provides practical tips for analysis with the necessary tools already being part of LightLogR. [Physiologically-relevant light exposure and light behaviour in Switzerland and Malaysia](#) dives into differences (and similarities) of light exposure between two different geographical and cultural locations. [Collecting, detecting and handling non-wear intervals in longitudinal light exposure data](#) investigates ways to detect non-wear data points and how to gauge their relevance based on sensitivity analyses.

Research for the future

The WP3 team has completed its investigation into the privacy issues posed by spatially resolved light loggers. This analysis drew on several similar use cases, including dash cams, CCTV, and Google Street View. In summary, the proposed mitigation strategies include minimizing the amount of data collected, using built-in blur algorithms before exploiting high-resolution images, securing data storage and transfer, and making the data processing methods and technical details publicly available. Furthermore, the team also formulated recommendations for characterizing spatially resolved devices, based on the technical report CIE 244:2021 (Characterization of Imaging Luminance Measurement Devices) and their experience with conventional light loggers.

On the technical front, the team is continuing to develop data methods for camera-based devices, such as applying a cosine correction to the acquired images to extract equivalent photometric quantities, similar to those recorded by spatially averaging devices.



Additionally, they are still exploring new information accessible through spatial resolution, such as assessing distributional homogeneity and characterizing light sources.

Picture of an Iberoptic device based on filtered camera image

In terms of development, the team considered several current technological possibilities for building a spatially resolved light logger, working towards a proof of concept. Valuable insights were gained from discussions with [Frederick Rudowski](#), the developer of the $\alpha\Omega$ -meter, which, to the consortium's knowledge, is the only spatially resolved light logger developed to date. In the coming months, the WP3 team will focus on prototyping and characterizing spatially resolved devices.

The project's dissemination activities and events

January 2024 – May 2024

The **activities** by the members of the MeLiDos consortium keep making visible the objectives:

June 2024	Members of LNE and other NMIs attended the CCPR 100 years V(lambda) anniversary workshop at BIPM
September 2024 	FUSP-CEU organized “The night of researchers” and activities with light dosimeters where shown to non-experts researchers
November 2024 	Science week at FUSP CEU RISE 05-08 November 2024: Optics & Photonics in Sweden conference 2024 - PhotonicSweden The Melidos team met in Bern for the midterm periodic meeting. Already halfway through the project!

January 2025	FUSP-CEU presented the Oral Communication “Melidos project: field experience with working protocols and visible light dosimeters.” at the Annual congress of the Spanish Group of Photobiology (GEF)
	Members and stakeholders met online for a workshop on future needs for light dosimetry, pooling together ideas for future collaborations
	The project’s NMIs joined other NMIs in Budapest for the Euramet TC-PR meeting, where LNE presented current progress of the project’s activities

The MeLiDos consortium continues, through multiple members, work closely with the interdivisional joint Technical Committee JTC 20 (JTC between CIE D6 [lead] and D2 [co-lead]) on Wearable optic dosimetry and light logging methods, limitations, device calibration and data schemes. It also presents its work on UV dosimeters at the World Meteorological Organization (WMO).

Reference readings:

Several communications and papers have been shared in Congresses by the different members

Guidolin, C., Aerts, S., Agbeshie, G.K. et al. Protocol for a prospective, multicentre, cross-sectional cohort study to assess personal light exposure. BMC Public Health 24, 3285 (2024).

<https://doi.org/10.1186/s12889-024-20206-4>

Upcoming events

- CIM Lyon, March 2025, <https://www.cim-metrology.org/en/>
- CIE's Midterm Meeting July 2025. <https://vienna2025.cie.co.at/>
- ECUVM 2025, Vienna, September 2025

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