MeLi Dos

Metrology for wearable light loggers and optical radiation dosimeters



Towards delivering

August 2025 – January 2026

This period has been rich in progress for MeLiDos, marking the beginning of the final year of the project, during which the deliverables are expected.

Update on device characterisation

Over the past months, the Work Package 1 team has been working on its deliverables:

Good Practice Guide Near Completion

The Good Practice Guide (GPG) is now in its final stages, with only minor finishing touches remaining. This guide that will be publicly available, aims to support in developing standardization for the characterization of wearable light loggers and solar UV dosimeters. It provides recommended methods for evaluating key parameters such as linearity, spectral response, and directional response, and includes dedicated sections on the influence of Temporal Light Modulations and Polarization. It also aligns with recommendations from JTC20, with the final goal being to complement the future JTC20 report with a more practical approach to light logger and solar UV dosimeter characterization.

An annex addresses general issues encountered during laboratory measurements in MeLiDos, offering recommendations for manufacturers to improve reliability and trust in these devices.

Upcoming Inter-Laboratory Comparisons

Two inter-laboratory comparisons, one for solar UV dosimeters and one for wearable light loggers, started in December 2025 and will run until April 2026, with 4 participants for each measured characteristic. After careful choosing the participants will measure spectral and angular responsivity as well as linearity and detection limit. This will be done for both the reported mEDI and illuminance in the case of wearable light loggers, and for the UV irradiance for the solar UV dosimeters.

These comparisons will follow the GPG recommendations for the measurement methods and aims to validate their reproducibility and reliability, ensuring consistency across different testing environments. A first version of the GPG is available on Zenodo and will be revised accordingly with the results of the two comparisons.

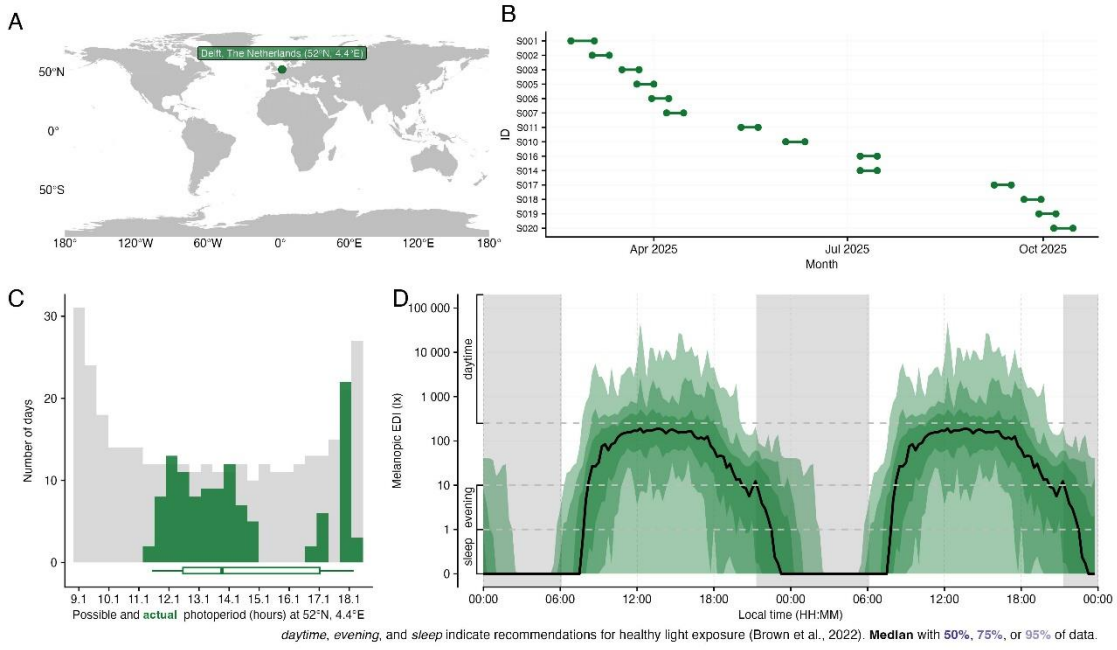
Field use of wearable light loggers

The Work Package 2 team has also been finalizing the work for WP2 during this period, notably with the end of the field data collection. Several tools to facilitate the use of wearable light loggers in the field are already available. In more details, the team has:

- Started an online course on data analysis for personal light exposure and visual experience data using LightLogR: https://tscnlab.github.io/LightLogR_webinar/ . We had a successful beginner seminar in October and advanced course in December, and the recording and interactive tutorials are hosted on the webpage. The next sessions are on the 3rd of March with a beginner session. So far 122 participants following the course.

- Released an online tool to gather specifications for wearable devices in order to facilitate procurement and study design. The application is available here: https://tscnlab-wearable-devices-specification.share.connect.posit.cloud/ . A short note is also submitted for publishing and available as preprint here: https://www.preprints.org/manuscript/202511.0644

- Finished data collection in the last three sites: Germany (Dortmund), The Netherlands, and Sweden. All released datasets will be hosted on the MeLiDosProject GitHub page (https://github.com/MeLiDosProject) and join the published datasets from Ghana, Spain, Turkey, Costa Rica, and Germany (Munich & Tübingen).



Exemple of dataset representation with LightLogR, here from the Delft site, Netherlands

Research for the future

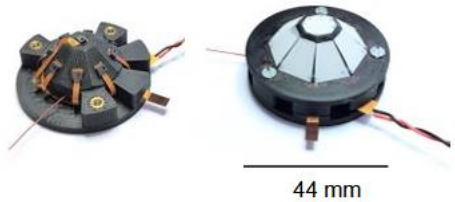
In Work Package 3, the development of three different spatially resolved light logger prototypes has been continued and is soon coming to an end:

- Iberoptics is improving the design of the camera-based light logger to achieve a larger field of view for the six images corresponding to six different spectral channels. Unfortunately, no suitable spectral filters with low spectral mismatch to the α-opic sensitivities have been found. The prototype will therefore use colour filters which only roughly approximate the α-opic sensitivities and V(λ). The prototype is expected to be finished by the end of 2025 and will be ready for characterisation in the beginning of 2026.
- The prototype in development by METAS is based on nine multi-spectral sensors with different directional orientations. Spectral mismatch to the melanopic action spectrum for this sensor is known from previous work of the consortium's members and is not ideal but quantifiable. The work has been mainly focused on the programming of the firmware. Since characterisation activities in Work Package 1 showed that a direct read-out of light loggers via USB cable is highly desirable for calibration purposes, this feature has been implemented in the firmware of the device. Additionally, wireless transfer of the log file from the device to the computer via WiFi is currently being implemented.
- The prototype device of INEGI has been assembled and the firmware developed. Similarly to the METAS prototype, it is based on nine multi-spectral sensors, however, combined with a lens to achieve spatial resolution. It features live tracking via USB and wireless data transfer to the computer via WiFi. The prototype device is currently being tested.

In the next months until the end of the project, the team of Work Package 3 will characterise their prototypes and compare them with the spatially averaging devices.



Prototype of the spatially-resolved light logger developed by INEGI.



Prototype of the spatially-resolved light logger developed by METAS.

The project's dissemination activities and events

August 2025 – January 2026

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

CONFERENCE ON OPTICAL DOSIMETRY Proyect EU Euramet: MeLiDos 21/10/25	This conference organized at the Spanish Association for Standardization presented concepts related to light dosimetry and its importance in the field of health, as well as the need to establish standards for its correct characterization. The project's participants presented all 3 work packages' activities from MeLiDos.
3rd European Conference on Solar UV Monitoring and Personal UV Exposure 9–11 September 2025, Vienna, Austria	Results and lessons learned from the evaluation of wearable solar UV dosimeters within MeLiDos were presented at the 3rd edition of this conference regrouping experts in solar UV and personal UV exposure: • Spectral characterization of ultraviolet radiation dosimeters (L. August) • Solar UV dosimeter calibrations in the frame of the MeLiDos EMP project 22NRM05 (G. Huelsen)
IEEE Sustainable Smart Lighting World Conference, 8-10 December 2025, Monastir Tunisia	Results on the field data collection carried out in Sweden within WP2 were presented during the "Visual and non-visual effects of light" session
A Day in Daylight	The LightLogR tool was used to produce a small dashboard for recommending proper daylight as part of another project. https://tscnlab.github.io/2025_ADayInDaylight/
Research Roundtable & Symposium: Diversity in the circadian, neuroendocrine and neurobehavioral effects of light in humans 17&18 September 2025:	A talk titled: "Decomposing light exposure patterns around the world: tools, methods, and FAIR data" was given as part of this chronobiology symposium (https://www.youtube.com/watch?v=fCHINJolDxQ&list=PLzoZGn0-37Xomt9ujgE_GVpx2htaFzJKf&index=10)
Euramet TC-PR, 27-29 January 2026, METAS, Switzerland	Progress on the objectives of the project have been shared with the representatives in photometry and radiometry metrology.

Reference readings:

Several papers have been submitted and are available in preprint or open-access version:

Johannes Zauner, Oliver Stefani, Gianfranco Bocanegra, Carolina Guidolin, Björn Schrader, Ljiljana Udovicic, Manuel Spitschan, Auxiliary data, quality assurance and quality control for wearable light loggers and optical radiation dosimeters, bioRxiv 2025.09.11.675633; https://doi.org/10.1101/2025.09.11.675633

Zauner, J.; Stefani, O.; Biller, A. M.; Guidolin, C.; Spitschan, M. A Web-Based Specification Tool for Wearable Light Loggers and Optical Radiation Dosimeters. Preprints 2025, 2025110644. https://doi.org/10.20944/preprints202511.0644.v1

Zauner, J., Thalji S. M., Tsukimori, E., & Spitschan, M. (2026, January). LightLogR newsletter (No. 02). https://zenodo.org/records/18267830

Upcoming events

- The last meeting of the MeLiDos consortium will be hosted by TUM in Munich, in May 2026

Acknowledgements:

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