

EURADOS – European radiation Dosimetry group

Activities in Environmental Monitoring

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European Radiation Dosimetry Group

- EURADOS is a network of more than 70 European institutions and 560 scientists. <http://www.eurados.org/>
- EURADOS activities include:
 - Coordination of Working Groups.
 - Organization of scientific meetings and training activities.
 - Organization of intercomparisons and benchmark studies.
- EURADOS is a non-profit organization, and its activities are funded by sponsoring institutions, funds raised by organizing events (meetings, training courses and intercomparison exercises), and from projects funded by the European Communities.

EURADOS Working Groups

- The Working Groups (WG) aim to promote scientific and technical research and development, and its implementation in routine work.
- The Working Groups are established according to different themes:

WG2 – Harmonisation of individual monitoring.

WG3 – Environmental dosimetry.

WG6 – Computational dosimetry.

WG7 – Internal dosimetry.

WG9 – Radiation dosimetry in radiotherapy.

WG10 – Retrospective dosimetry.

WG11 – High energy radiation fields.

WG12 – Dosimetry in medical imaging.

EURADOS actions and activities 1/2

- EURADOS arranges an annual meeting (AM) that combines statutory actions (general assembly, council meeting), working group meetings and general interest events such as Winter Schools or workshops on a particular topic.
- EURADOS is involved with identifying research priorities in the field of dosimetry on the European Joint Programme for the Integration of Radiation Protection Research (CONCERT).
- EURADOS is also a member of the CONCERT Management board and its Executive board.

EURADOS actions and activities 2/2

- EURADOS strategic research agenda (SRA) was published in 2016 and includes five visions for dosimetry and five key issues in dosimetry research:
 - a) Updated fundamental dose concepts and quantities.
 - b) Improved radiation risk estimates deduced from epidemiological cohorts.
 - c) Efficient dose assessment for radiological emergencies.
 - d) Integrated personalized dosimetry in medical applications.
 - e) Improved radiation protection of workers and the public.

W.Rühm et al., *EURADOS strategic research agenda: vision for dosimetry of ionising radiation*. Radiation Protection Dosimetry Feb 2016.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4884873/>

- The SRA was established with input from the working groups.

Working Group 3 – Environmental dosimetry

- The topic of environmental dosimetry is closely related to the European dose rate monitoring networks (such as the Finnish USVA maintained by STUK).
- The Working Group 3 is divided further into two subgroups:
 - WG3-S1 "Spectrometry systems for Environmental Dosimetry"
 - WG3-S2 "Passive Environmental dosimetry"
 - the formation of a third subgroup: Radon was proposed at the AM2018.
- The aim of Working Group 3 is the correct measurement of the ambient dose equivalent, the ambient dose equivalent rate (ADER), and activity concentrations caused by different release scenarios.

WG3 Intercomparison activities

- The detector systems used in dose rate monitoring networks of various European countries have been intercompared six times. Up until the 4th intercomparison the instruments were primarily Geiger-Muller counters or proportional counters.



LaBr₃(Ce) Spectrometer
measuring a plume simulation
(4th EURADOS intercomparison
2008).

- Development and intercomparison of scintillation based probes for early warning networks has been carried out by WG3 in collaboration with MetroERM project.

WG3 Work Programme

The WG3 is intended to provide:

1. Metrological support of the harmonisation process of early warning dosimetry network systems in Europe.
2. Development of methods for environmental dosimetry.
3. Organisation of comparison programmes.
4. Investigation of the use of gamma-ray spectrometry systems for environmental radiation monitoring, including drones.
5. Publication of technical recommendations, peer review papers, and EURADOS reports.
6. Stimulation of cooperation, data exchange platforms, national authorities, research projects, and others.

W.Rühm et al., *The work programme of EURADOS on internal and external dosimetry*. Annals of the ICRP. Apr. 2018.

<http://journals.sagepub.com/doi/full/10.1177/0146645318756224>

WG3-S1 "spectrometry systems for environmental dosimetry" activities

The activities of WG3-S1 are grouped into four subject areas:

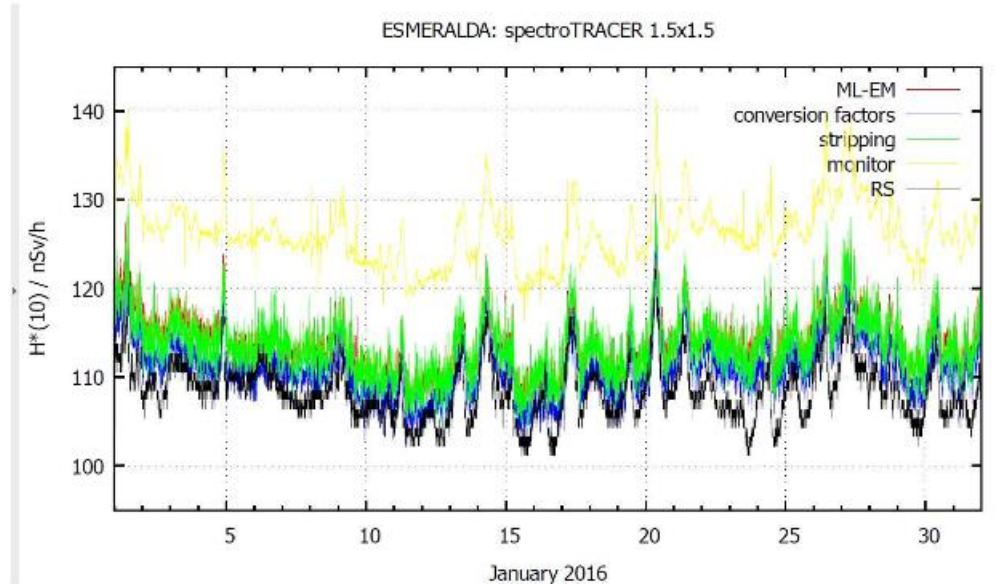
1. Comparison of methods for calculating ambient dose equivalent rates from photon spectra (in collaboration with the MetroERM project).
2. Comparison of automatic tools for spectra analysis, such as full spectra analysis and peak-based nuclide identification.
3. Harmonisation and uncertainty analysis of dose rate meters and spectrometric monitors in collaboration with the CONFIDENCE project and the real-time radiological data platform EURDEP.
4. Development of mobile spectrometric monitors. To develop, test, and validate metrologically traceable systems and methods for remote measurements using unmanned aerial vehicles commonly named 'drones', with spectrometry systems mounted on them. This activity will be carried out in the framework of the European project 'Preparedness' (Metrology for mobile detection of ionising radiation following a nuclear or radiological incident)

W.Rühm et al., *The work programme of EURADOS on internal and external dosimetry*. Annals of the ICRP. Apr. 2018.

Recent activities in the WG3-S1 subject areas 1/5

S1-WP1: Comparison of methods for calculating $H^*(10)$ from spectroscopic measurements:

Band method, Stripping method, nuclide specific dose rate, FSA method were compared. Aim at report / publications on the subject.



A.Vargas, *WG3 Environmental Dosimetry progress report*. EURADOS AM 2018. Feb. 2018.

<http://www.eurados.org/>

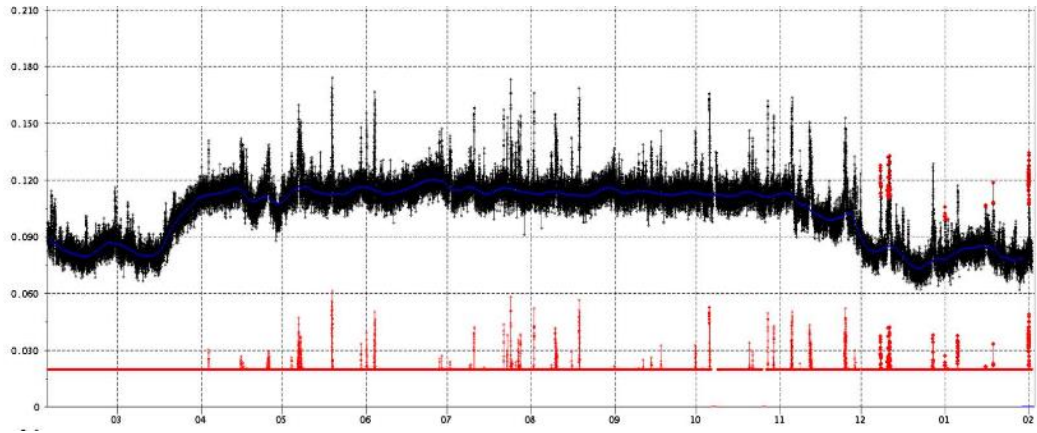
[/media/Files/Eurados/documents/Working_Groups/2018/progressreport/WG03_2018.pdf](http://www.eurados.org/media/Files/Eurados/documents/Working_Groups/2018/progressreport/WG03_2018.pdf)

Recent activities in the WG3-S1 subject areas 2/5

S1-WP2: Harmonization of dose rate monitors and spectroscopy detectors:

Data from spectroscopy and classical detectors is used to compare different methods.

NetADER is investigated and proposed to be used as a simplification for data harmonization.



A.Vargas, *WG3 Environmental Dosimetry progress report*. EURADOS AM 2018. Feb. 2018.

http://www.eurados.org/-/media/Files/Eurados/documents/Working_Groups/2018/progressreport/WG03_2018.pdf

Recent activities in the WG3-S1 subject areas 3/5

S1-WP3: Code development for spectrum analysis and $H^*(10)$ calculation

A complete spectrum analysis framework was developed for automatic and manual processing of spectra from spectrometric probes.

- FullSpectrumAnalysis (FSA) method for $H^*(10)$ calculation and automatic energy calibration.
- Stripping method for $H^*(10)$ calculation.
- Mariscotti based peak analysis tool.
- GUI for geant4 based MC simulations to calculate simulated spectra and stripping matrix for individual detectors.

The developed codes are intended to be made available to the general public

A.Vargas, *WG3 Environmental Dosimetry progress report*. EURADOS AM 2018. Feb. 2018.

<http://www.eurados.org/>

[/media/Files/Eurados/documents/Working_Groups/2018/progressreport/WG03_2018.pdf](http://www.eurados.org/media/Files/Eurados/documents/Working_Groups/2018/progressreport/WG03_2018.pdf)

Recent activities in the WG3-S1 subject areas 4/5

S1-WP4: Application of UAV-based systems including calibration procedures and intercomparison exercises:

Organization of intercomparisons, development of mobile spectrometric monitors for unmanned aerial systems, calibration procedures in association with the Preparedness project.

A.Vargas, *TWG3 Environmental Dosimetry progress report*. EURADOS AM 2018. Feb. 2018.

<http://www.eurados.org/>

[/media/Files/Eurados/documents/Working_Groups/2018/progressreport/WG03_2018.pdf](http://www.eurados.org/media/Files/Eurados/documents/Working_Groups/2018/progressreport/WG03_2018.pdf)

Recent activities in the WG3-S1 subject areas 5/5

The progress of the activities is furthered in *technical meetings* held by the working group.

The next WG3-S1 technical meeting is scheduled to be held in Helsinki 25. – 26.9.2018

A meeting on the CONFIDENCE project will also be held in conjunction with the WG3 technical meeting.

References

EURADOS European radiation dosimetry group website.

<http://www.eurados.org/en>

W.Rühm et al., *EURADOS strategic research agenda: vision for dosimetry of ionising radiation*. Radiation Protection Dosimetry. Feb 2016.

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