WG 3
Environmental Dosimetry

Arturo Vargas

EURADOS AM 2018, Lisbon 5th February – 8th February
Plans 2017

**Subgroup WG3-S1 “Spectrometry systems for Environmental dosimetry”**

- Task 1.2. Report/publication on Comparison of automatic tools for spectra analysis such as FSA (Full Spectra Analysis), peak-based nuclide identification and automatic energy re-calibration techniques.
- Task 1.3. Report on Harmonization and uncertainties of dose rate meters and spectrometric monitors. Collaboration with CONFIDENCE and EURDEP.
- Database and MC simulation transversal issues

**Subgroup WG3-S2 “Passive Environmental dosimetry”**

- Task 2.1. Peer-review publications based on the achievements of WG3-S2 including the 1st Intercomparison ‘IC2014env’ and results from surveys by questionnaires.
- Task 2.2. Preparedness project preparation of an intercomparison of passive area dosemeters (October 2017).
- Task 2.3. Intercomparison of calibration methods for passive area dosemeters ‘IC2017calm’ coordinated by KIT (Summer 2017).

**Other issues in Environmental Radiation Monitoring**

- Radon: WG2+WG3+WG7
S1-WP1 “Methods for calculation of $H^*(10)$ of spectroscopy monitors”

Task 1 Report/publications on Comparison of methods for calculating $H^*(10)$ at different reference stations and spectrometric monitors

1. ADERbs: **Band method** to calculate ADER from spectra
2. ADERss: **Stripping method** to calculate ADER from spectra
3. ADERNs: total nuclide specific ADER from peak based method as **sum of nuclide specific dose** of all identified nuclides (after conversion from activity concentration to $H^*(10)$)
4. ADERfs: total nuclide specific ADER from FSA method as **sum** of nuclide specific dose of all identified nuclides
5. ADERgn: gross ADER obtained from **classical** detectors
**S1-WP2 “Harmonization of dose rate monitors and spectroscopy detectors”**

**Task 2 Report on Harmonization and uncertainties** of dose rate meters and spectrometric monitors
Data from spectroscopy and classical detectors will be used to compare the different methods – discrepancies need to be discussed.

**netADER will be investigated**

The proposal is to use the netADER as a simplification for data harmonization. In a first step it is planned to extend this work to the EURDEP network and in a second step to include spectrometric detectors.

**netADER calculated from grossADER by calculation of a 7 day medianADER** (values below detection sensitivity (in Germany 20 nSv/h) are set to zero)
S1-WP3 “Code Development for spectrum analysis and $H^*(10)$ calculation”

Task 3 Dissemination of developed code

A complete spectrum analysis framework was developed for automatic and manual processing of spectra from spectrometric probes reflecting requirements defined within WG3/S1:

1. Development of Full Spectrum Analysis (FSA) method including the capability to obtain quantitative dose rate values in units of $H^*(10)$
2. Implementation of peak based and FSA based method for automatic energy calibration
3. Development of a tool to obtain $H^*(10)$ using the stripping method
4. Development of a Mariscotti based peak analysis tool
5. Development of a GUI for geant4-based MC simulations allowing to calculate simulated reference spectra and the stripping matrix for individual detectors

The source code of all components is open-source and written in ANSI-C (or root)

Since these types of code are not available in general, it is intended to make this (and other code developed within WG3/S1) available to the general public – if possible in the framework of EURADOS.
S1-WP4 “Application of UAV-based systems including calibration procedures and intercomparison exercises”

Task 4 Preparedness project. Organization of intercomparisons

- Barcelona drone Center $S = 25 \text{ km}^2$
- Aerial site of Vyškov – Military Exercise Area $S = 0.18 \text{ km}^2$

**Zirconium Sand.** (3000 Bq/kg Ra-226)

**Artificial sources**
- Co-60 from 10 MBq up to 15 GBq
- Cs-137 from 10 MBq up to 3 GBq
- Eu-152 0.5 GBq
S2 - Task 1 Analysis of the updated survey by an extended questionnaire for European passive area dosimetry systems.
S2 – Task 2 Preparedness project preparation of intercomparison of passive area dosemeters (6-months measurement period October 2017 - April 2018)

European EURAMET project: Preparedness coordinator Stefan Neumaier project includes partners from EURADOS-WG3

Radiation Measurements 106 (2017) 229–234

EURADOS intercomparison of passive $H^*(10)$ area dosemeters 2014

Harald Dombrowski, Maria A. Duch, Christian Hranitzky, Philip Kleinau, Stefan Neumaier, Mária Ranogajec-Komor, Rafael Rodriguez
S2 – Task 3 Organization of a first Interlaboratory Comparison of calibration methods for passive area dosemeters “IC2017calm”.

Test Intercomparison (organized within the subgroup) coordinated by KIT
14 participants from 10 different countries + 1 reference laboratory PTB
Goal: 3 mSv Cs-137 irradiation of 5 $H^*(10)$ dosemeter spheres

![Graph](image)

**deviation to reference laboratory in %**

- error bars = total uncertainty (k=1)
WG3 decided to propose the creation of a new Subgroup 3 regarding Radon (55 members attend the meeting today. Similar than in the 1st meeting was in Karlsruhe Am2017)

**Responsible**: Frank Wissman (BfS) and Anette Röttger (PTB)

**Activities**:
- Letter of agreement with MetroRadon (EURADOS – MetroRadon)
- Use of the new dose conversion factors published by ICRP
- Organize radon inter-comparisons
- Harmonization between dose and activities (ICRM connection)
- Communication and education
**Plans 2018**

Subgroup WG3-S1 “Spectrometry systems for Environmental dosimetry”
- **Task 1.** Report/publications on Comparison of methods for calculating $H^*(10)$ at different reference stations and spectrometric monitors.
- **Task 2.** Report/publication on harmonization of $H^*(10)$ monitors including classical monitors and spectrometric detectors.
- **Task 3.** Code Development. Dissemination of automatic tools in EURADOS for spectra analysis such as FSA (Full Spectra Analysis), peak-based nuclide identification, energy re-calibration, ...

Subgroup WG3-S2 “Passive Environmental dosimetry”
- **Task 1.** Analysis and preparation of a final report of the survey of European passive area dosimetry systems by questionnaires 2012-2017.
- **Task 2.** Preparedness project evaluation of the intercomparison of passive area dosemeters (6 months measurement period until April 2018)
- **Task 3.** EURADOS intercomparison of calibration methods for passive area dosemeters “IC2018calm” with KIT dosemeters (summer 2018).

New subgroup on Radon topic WG3-S3
- **Task 1.** Letter of agreement with MetroRadon Project
- **Task 2.** Starting activities in relationship with MetroRadon

S1 and S2 2018 meetings in Bilbao/Helsinki (S1). Radon with MetroRadon
## Budget

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Vision 5: Towards improved radiation protection of workers and members of the public

Challenge 5: To develop accurate and on-line information for in-situ environmental dosimetry

Drivers

- Optimal radiation protection of the public including emergency preparedness
- Support to governmental decisions in case of nuclear emergency

Targets

- Improvement of environmental radiation monitoring networks in Europe
- Provide reliable environmental radiation monitoring
- Harmonized monitoring in surveillance networks

Experimental & computational realisation

- Organization of regular intercomparisons
- Input from industry and regulatory bodies
- Input from simulations and measurements

- Improvement of existing dose rate monitors and spectro-dosemeters and development of new instruments for governmental and non-governmental applications
- Development of automatic software systems for activity concentration level display
- Extended functions for further data analyses

- Implementation of unmanned aerial monitoring systems
- Implementation of harmonised calibration and data evaluation methods
- Implementation of novel spectrometric instruments in surveillance networks

- Extension of network data bases for implementation of harmonization algorithms for all in-situ data
- Creation and implementation of new algorithms for net dose rate calculation and spectral analyses

Drivers

- 2015
- 2025
- 2035
NERIS Research Gap Analysis (3)

- **Proposal for research activities based on the GAP analysis** *(related to EURADOS)*

  – Improvement of dose assessment models considering both environmental monitoring data and personal monitoring data (e.g. personal dosimeters, thyroid measurements, whole body measurements)

  – Improved monitoring including lay people, drones and European wide harmonisation of tools and methods
THANK YOU!