

Editorial

To be honest, I had wondered if CONCERT would ever see its first open call, or if this much awaited event would remain like an unseen character, such as Godot or *l'Arlésienne*, much talked about but who never materialises. However, thanks to the hard work of the BFS management team and colleagues from the ANR, the call has finally been launched: http://www.concert-h2020.eu/en/Calls/Transnational_Call_2016.

New infrastructures are continuously being added to AIR²D²: <http://www.concert-infrastructures.eu/home>.

The large number already available offers a wide choice (exposure platforms; databases-sample banks-cohorts; analytical platforms-models-tools) to consortia looking for partners with up-to-date technology. - **Dr Laure Sabatier**

The floor to...

Although the international radiation protection system today is sophisticated, thanks to decades of research in epidemiology, physics and radiobiology, there remain many unresolved issues that obstruct the optimisation of radiation protection, particularly in the medical field where most man-made exposure of people to ionising radiation occurs. There are no adequate and proven models for evaluating individual sensitivity. However damage to healthy tissues, particularly through advanced radiotherapy protocols such as proton therapy, is now limited due to sophisticated radiation ballistics, but it is still not well enough understood to develop efficient preventive treatments for relevant organs.

By developing and promoting a European strategic research agenda, MELODI encourages the involvement of all pertinent disciplines in innovative research projects with the aim of generating innovative risk models representative of the effects of low dose radiation exposure and addressing the mechanisms of interaction between radiation and living organisms at different levels: cellular and sub-cellular, tissues, pathological impacts. However all this multidisciplinary research requires access to rare laboratory infrastructures that are able to reproduce realistic exposure conditions, including at very low dose rates and for a wide variety of radiation types, and that are also able to provide very precise

and metrologically reliable measurements of all the quantities needed to evaluate radiation exposures and their effects.

Thus, from an early stage MELODI has been working closely with fellow organisations such as EURADOS and other European platforms to initiate actions to facilitate access to the available European research infrastructures in this research area. This includes the development of up-to-date catalogues of infrastructures, providing detailed characteristics and common

access conditions, taking into account that these infrastructures often belong to security-sensitive nuclear research centres or to very busy medical research centres.

Resources provided by EURATOM through projects such as OPERRA or CONCERT are gratefully acknowledged for the pursuit of this generic effort to optimise the opportunities offered by existing infrastructures and by new infrastructures being developed across Europe.

High quality, accessible infrastructures are key to the success of research on low dose radiation health effects

Dr Jacques Repussard
President, MELODI
European Association



Photo: A. Devouard/IRSN

Future events:

CONCERT : a [model for European Integration](#)

2 Aug 2016: Deadline for the first CONCERT call

19 Sept 2016: ExB meeting, 1:00-3:00pm, Oxford, UK

23 Sept 2016: MB meeting,

WP 6 News:

Update of AIR²D²:

- Please complete the online [form\(s\)](#) to register your infrastructure(s) in the database.

- A new option to feature your infrastructure is now available: [add document](#).

11 July 2016: "Harmonization Exercise" Presentation Day, Brussels, Belgium

12 July 2016: Task 6.2 presentation day, Brussels, Belgium

Contents:

Exposure platforms	SCRS-GIG
Databases, Sample banks, Cohorts	RES³T
Analytical platforms, Models, Tools	CROM-8

Next issue

September 2016

Exposure platforms

Silesian Centre for Environmental Radioactivity (SCRS-GIG) A multipurpose irradiation facility for all types of radiation

Radiation research at the Central Mining Institute (GIG) began in the early 1970s with the discovery of enhanced natural radioactivity in coal mines. The rapid development of scientific and technical capabilities and the wider understanding of radiation protection which followed, led to the creation of the Silesian Centre for Environmental Radioactivity (SCRS-GIG); the facility moved to new premises in 2012. Furthermore, the experience gathered in complex NORM investigation allowed the SCRS-GIG team to assist the emerging Polish nuclear industry to solve problems related to environmental radioactivity.



Photo: S. Jaroslawska-Sobór/GIG

Optical calibration bench for controlled exposure to gamma and X radiation using IM6/M-2 irradiator (Cs-137: source activity: 100 Ci, 1 Ci and 10 mCi) and/or XCS-320-ST/X-RAY CAL Vacuum tube (320kV)

In order to maintain the provision of high quality radiation monitoring, a complex system of irradiation facilities has been developed. A radon chamber of 17 m³, allowing control of climatic parameters, is used for exposure to alpha radiation in the atmosphere with controlled radon concentration. As radon progeny-forming aerosols are crucial in this case, it is possible to generate and measure polydisperse/monodisperse aerosols in the air, in the size range of nm to µm, using instrumentation from TSI (USA).

Using a Gamma irradiator IM6/M-2 with Cs-137 sources (air kerma rate varies from 1.5 µGy/h to 187 mGy/h) or with an X-Ray machine of the type XCS-320-ST/X-RAY CAL (320 kV), equipped with a set of filters in order to modify the X-Ray beam according to ISO rules an object can be irradiated at different distances, ranging from 300 to 4000 mm, changeable every 1 mm. Maximal air kerma rate is ca. 40 Gy/h.

Besides exposure to a straight radiation beam, two stands are used for panoramic irradiation at given distances (1m, 0.7m and 0.3m) using an IN1/P neutron irradiator with Am-241/Be source, 1 Ci activity (flux density: 6.6×10^{-5} Nxs⁻¹xBq⁻¹ for neutron energy 0.025 eV - 12 MeV; dose rate at a distance of 1m: ca. 30 uSv/h) or with an IM1/P gamma irradiator with a Cs-137 0.05 Ci source (available air kerma rate: 150 - 1700 µGy/h). As high penetrating radiation is not the only source of risk, an installation with an IB1/P beta irradiator (Sr-90, 0.05 Ci) is also in use. The radiation beam is collimated and the distance can be changed up to 1m from the source. The dose rate varies from 50 to 3100 mSv/h.

All these installations are located in an air-conditioned, shielded room in the underground part of SCRS-GIG's new headquarters, and are currently used for calibration of a wide variety of radiometric devices under different ambient conditions.

As all these activities need to be coupled with relevant measurement possibilities, a wide variety of radon and radon progeny, and dose and exposure measurement techniques has been developed and implemented. Additional support is provided by a well equipped low-background, high resolution gamma spectrometry laboratory, an alpha spectrometry laboratory or LSC laboratory with two QUANTULUS counters.

All the installations can be easily adapted, upon request, to expose living organisms to different kinds of radiation.



Photo: A. Jastrząb-Nejbor

Malgorzata Wysocka

ID Card:

Exposure type:

Internal (inhalation), external

Sources:

Radon & radon progeny, X-ray tube, Cs-137, Am-241/Be, Sr-90

Dose rate:

Gamma (collimated beam):

0.001 – 187 mGy/h

Gamma (panoramic):

150 - 1700 µGy/h

X-ray (collimated beam): up to 40 Gy/h

Neutron (panoramic): ca 30 uSv/h

Beta (collimated beam):

50-3000 mSv/h

Radon: activity concentration in air up to ca 10 kBq/m³

Irradiation type:

Alpha - ambient atmosphere (3D),

Gamma - beam & panoramic,

Neutron - panoramic,

Beta- beam

Irradiated organism type:

Possible, not exposed yet : Cell cultures, animals (small rodent size), vegetation (pot size).

Address:

Główny Instytut Górnictwa
Plac Gwarków 1, 40-166 Katowice,
POLAND

Access:

selection committee (bilateral/
multilateral collaboration, access
frequency limited

Supporting lab:

alpha, gamma spectrometry, LSC,
TLD dosimetry, X-ray & gamma
secondary reference standards

Internet link:

www.radiometria.gig.eu

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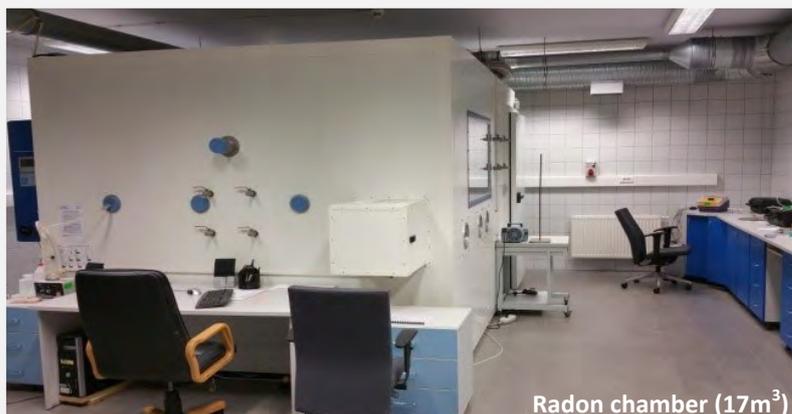


Photo: B. Michalik/GIG

RES³T

Mineral-specific sorption data (for mechanistic models)

RES³T, the Rossendorf Expert System for Surface and Sorption Thermodynamics, is a digitised thermodynamic sorption database which is implemented as a relational database. It is mineral-specific and can therefore also be used for additive models of more complex solid phases such as rocks or soils. Its purpose is to support reactive transport modelling for contaminants through the geosphere and ecosphere. RES³T allows the parameterisation of mechanistic sorption models, offering added value in the form of explanations and scientific support for measured data, and increasing confi-

constants are provided (no recommended values), thus the user has to decide which values to actually use. The surface complexation models which are most extensively covered include the Constant Capacitance, the Diffuse Double Layer, the Triple Layer, the Non-electrostatic and the CD-MUSIC approaches. The two surface protolysis steps are supported. The selection of minerals via the RES³T interface allows comprehensive modelling of retardation in most of the relevant soil and rock types, thus delivering source terms for a broad variety of transfer coefficients. The focus for dissolved contaminants and ligands is currently set to radionuclide, heavy metals and arsenic, but in principle any dissolved moiety that is able to sorb onto surfaces can be included.

An extensive bibliography is also included, providing links not only to the above-listed data items, but also to background information on surface complexation model theories, surface species evidence by independent spectroscopic and quantum chemical approaches, and sorption experiment techniques. Access to the database is free and requires no registration. However, the developers are grateful for any critical feedback to further improve functionality and extend the range of application areas.

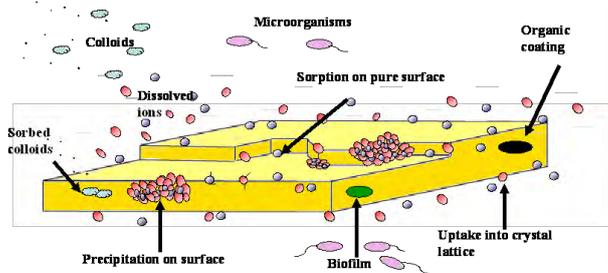
This project was funded by the German Federal Ministry of Economics and Labour (BMWA) under contract No. PtWt+E 02E9471.



Photo: J. Grämer / HZDR

Vinzenz Brendler

Sorption Phenomena: A Complex World



Ambivalence: retardation vs. mobilization

The universum of processes affecting the transport of contaminants through the ecosphere

dence levels especially for K_d values measured under complex site-specific conditions. Predictive uses can provide approximations for parameter spaces that are difficult or too time-consuming for experiments. Combined with sensitivity and uncertainty analyses, it can probe the influence of variability and uncertainties in geochemistry on K_d . It may also improve experimental set-up. In addition, it can provide scoping calculations and estimate the possible effect of "what-if" scenarios on K_d .

An integrated user interface helps to access selected mineral and sorption data, to extract internally consistent data sets for sorption modelling, and to export them into formats suitable for other modelling software. Data records comprise mineral properties, specific surface area values, characteristics of surface binding sites and their protolysis, sorption ligand information and surface complexation reactions. The database contains originally published values only, i.e. for many surface reactions, different competing

ID Card:

Database topic:

Geochemistry,
Radioecology

Information available type:

Mineral-specific sorption data (for mechanistic models)

Data type:

Thermodynamic sorption data, mineral characteristics, bibliography

Link with a biobank:

Not available

Exportable:

ASCII, CSV, MS Excel

Species:

138 Ligands onto 135 minerals (as of April 2016)

Internet link:

www.hzdr.de/res3t

Access:

Free, but usage shall be cited

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Related to:

Photo: V. Brendler / HZDR



CROM-8

A code to integrate dose assessments for humans and biota

CROM code was initially designed as a computational tool to implement the more complex models described in the Safety Report Series No 19 (SRS-19) of the International Atomic Energy Agency (IAEA), but has evolved to include new capabilities. The SRS-19, published in 2001, compiles the generic models for the transport of radionuclides in the environment (produced as a discharge in an installation) and all their associated parameters.

specified in the SRS-19 for humans nor those in the ERICA-Tool for biota. The code does allow assessments to be performed in rivers, lakes and marine environments and in contaminated atmosphere and soils.



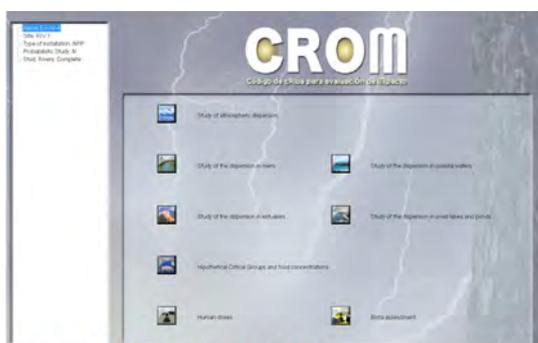
Photo: JC Mora/CIEMAT

Juan Carlos Mora

The CROM tool was developed by the CIEMAT and the Polytechnic University of Madrid and co-sponsored by CIEMAT, ENRESA, IAEA and STAR.

Simultaneous to the development of CROM 8, parallel development began on the Open Platform CROM (OP-CROM), with the aim of creating a flexible tool that would allow implementation of any model, including the SRS-19 models, and which could be run on different computer platforms (operating systems and computer architecture). Another aim of OP-CROM was to enable all data and parameters to be input or generated as separate text files, rather than use an established database as is the case in the CROM family. Further, the tool would be freely distributed and would follow the open software philosophy, allowing others to contribute to its development.

In fact, OP-CROM has exceeded these aims (Figure 2), and plans exist to: generate new modules with advanced models; develop modules allowing dynamic calculations; include additional default parameters, or additional graphical user interfaces to allow the results to be presented in maps integrated into other tools such as Google Earth.



Picture: CIEMAT

Figure 1: Main screen of CROM8

In 2007, CROM 6, a stable version, quality controlled by the IAEA, was distributed by the Agency worldwide as the basis for the calculation of these models. This was followed by CROM 7, created to propagate the uncertainties of the measurements and parameters through the models, and then almost immediately by a new version, CROM 8, to include the protection of the biota, in accordance with the requirements of the IAEA and the EU. All these versions are freely available at <ftp://ftp.ciemat.es/pub/CROM>.

CROM 8 (Figure 1), a tool for integrated assessment of effective doses for humans and absorbed doses for biota, was developed on the basis that both approaches require contamination levels of environmental media, such as air, freshwater, soil, etc, as inputs. Therefore, the use of common models to derive these concentrations from the discharges produced in a nuclear, radioactive or even a NORM installation, would allow simultaneous calculations to be performed. CROM 8 includes default data for 162 radionuclides for humans and 63 for biota. Two sets of Reference Animals and Plants are also available: one from ICRP and accepted by the IAEA, and another from ERICA. The code does not include the screening levels (tiers)

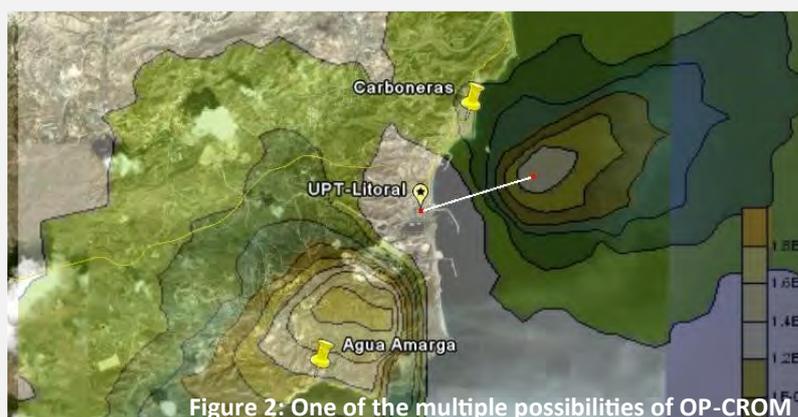


Figure 2: One of the multiple possibilities of OP-CROM

Picture: CIEMAT



ID Card:

Purpose:

Dose estimation in humans and biota.

Capacity:

N/A (freeware)

Use:

Integrated assessment of effective doses for humans and absorbed doses for biota.

Housed at:

CIEMAT

Software Training: Manuals available in English and Spanish. CIEMAT provides training upon request.

Address:

CIEMAT, Av Complutense 40, Madrid 28040, Spain

Access:

Free

Internet link:

<ftp://ftp.ciemat.es/pub/CROM>

Contact:

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+34 91 346 6751

Related to:

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Future events:

- 4-8 July 2016: [CONCERT](#)
Course on Uncertainty Analysis for Low Dose Research, Barcelona, Spain.
- 2 Aug 2016: Deadline for Transnational call for proposals on "Radiation Protection Research in Europe" through the EJP CONCERT
- 4-8 Sept 2016: 42nd Annual Meeting of the European Radiation Research Society, [ERR2016](#), Amsterdam, Netherlands
[Registration open](#)
- 19-23 Sept 2016: Radiation Protection Week, [RPW2016](#), Oxford, UK.
[Registration open](#)
- 3-5 Oct 2016: International Conference on Research Infrastructures, [ICRI2016](#), Cape Town, South Africa
- 5-7 Dec 2016: [8th EAN_{NORM}](#), Stockholm, Sweden.
- 14-19 May 2017: Neutron and Ion Dosimetry Symposium, [NEUDOS13](#), Krakow, Poland

Issue	Exposure platforms	Databases, Sample banks, Cohorts	Analytical platforms, Models & Tools
Published to date:			
Oct 2015, #1	FIGARO	FREDERICA	RENEB
Nov 2015, #2	B3, Animal Contamination Facility	The Wismut Cohort and Biobank	The Hungarian Genomics Research Network
Dec 2015, #3	Cosmic Silence	STORE	Metabohub
Feb 2016, #4	SNAKE	French Haemangioma Cohort and Biobank	Dose Estimate, CABAS, NETA
Mar 2016, #5	Radon exposure chamber	3-Generations exposure study	ProFI
Apr 2016, #6	Biological Irradiation Facility	Wildlife Transfer Database	Radiobiology and immunology platform (CTU-FBME)
May 2016, #7	CIRIL	Portuguese Tinea Capitis Cohort	LDRadStatsNet
Jun 2016, #8	Mixed alpha and X-ray exposure facility	Elfe Cohort	ERICA Tool
Jul 2016, #9	SCRS-GIG	RES3T	CROM-8
Coming soon:			
Sep 2016, #10	Facility radionuclides availability, transfer and migration	INWORKS cohort	France Génomique