

EURAD's final annual event!

TAKE A LOOK AT THE DRAFT AGENDA



EURAD's Final Event will take place in **Bucharest, Romania** **from April 23 to 25, 2024.**

The final annual event will provide an action-packed 3 days of sharing the latest progresses across all EURAD work packages.

The event will be in person only.

Tuesday 23rd to Thursday 25th:

- panel session
- students' event
- EURAD WPs results presentations
- Lively debates.

You can take a look at the draft agenda [here](#).

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INTERVIEW WITH ANDERS SJÖLAND (SFC WP LEADER)

In a nutshell, could you describe how SFC contributes to a safer disposal of spent nuclear fuel?

The spent nuclear fuel has a number of very dangerous properties, which make us go to such length to safely dispose of it, literally forever. These properties are the radiation, the ability to become critical, the decay power giving heat, and the nuclide inventory giving radiation on release (as well as, in some cases, being chemically toxic). In order to safely handle the spent fuel, these properties must be accurately known in all steps of the back-end of the nuclear fuel cycle. There are limits on how many of these can be accepted in the various parts of the cycle up to the final disposal. Usually, the thermal power is the limiting factor, due especially to requirements on temperatures. In other words: the disposal is in essence a thermal problem, which means the decay power has to be accurately known for each fuel element to be disposed. If the temperature limits are not met, the safety assessment of a repository is no longer valid. The thermal situation for repository must therefore be accurately known to have a correct initial state for the safety analysis – without this, it is no longer valid.

SFC also explores new methods for the future, such as machine learning and deep learning (often now included as AI, but here deployed in a strict scientific way).

Even though most radionuclides in the fuel are measurable, which are the problematic ones and why?

This depends on how one wants to measure the nuclides. It is possible to perform destructive analyses of the spent fuel, which has been done to a certain extent over the decades, giving important

information on the composite nuclides. For the operational situation, it is not possible to routinely destroy the fuel in order to analyse it.



This is why non-destructive analyses, which enable to measure the fuel from the 'outside', are required. This is done by measuring the gamma rays and the neutrons coming from the fuel, which all in different ways give direct or indirect information about the composite nuclides of the fuel. Alternatively, the entire fuel assembly can be measured in a 'thermos' for decay heat (calorimetry), which also gives very important information about the fuel – including being the validation for all the codes used to calculate all the properties listed in the previous question.

Depending on which property is analysed, the different nuclides are of greatest importance. For the decay power, Cesium-137 is the most important one for example. Due to the large flux of gamma rays from the fuel there are considerable problems to determine nuclides.

All measurements and modelling are associated with uncertainties. In SFC, what is the reasonable (considering time, costs, handling, radiological dose, ...) nuclide uncertainty inventory targeted?

Because of its importance, the decay power has been a focus point of SFC, and not just the uncertainty analysis for the determination of the decay power. The resulting uncertainty depends on a number of factors, one being to what extent a type of fuel has been experimentally characterised. For the decay power, the only continuous operating calorimeter in the world has been the Swedish one at the intermediate storage facility Clab in Oskarshamn. This means that the fuel types at Clab, PWR and BWR, have been fairly well characterised. Many important fuels have not been calorimetrically characterised, such as MOX, VVER, CANDU, to mention a few currently in operation. In the very near future (from 2025 in Europe due the European taxonomy law) the ATFs (Accident Tolerant Fuel) will be required. These have been very poorly characterised so far and must be a European priority for characterisation in my opinion.

This means that the obtainable uncertainty is not constant but varies according to a number of parameters.

Simply put, a one sigma uncertainty of 2 % is a realistic aim for a well characterised fuel. For other fuels, it has been shown in a number of prominent SFC journal papers that the uncertainties in nuclear data (cross sections etc.) can be up to 10 % on the calculated decay power. The question on the number of sigma's to apply is a complicated one because of the complicated statistics of the spent fuels, and is the focus of an intense international debate in various organisations. The result

of this will decide upon the economy of final repositories to a very large extent, as the difference may be in total for all countries exceeding 100 billion Euros.

One part of the SFC WP is about the safe handling of SNF during the pre-disposal phase. Considering the R&D performed in the WP, what outcome is of crucial importance and why so?

SFC is a very broad work package. The physical characterisation mentioned in the previous answers is an important part, as there are limits on the outside temperature of the fuel cladding for example (usually 400 C°) - if this limit is surpassed, the mechanical properties of the fuel are in jeopardy, risking that a fuel may break during the handling, transport or storage, with release of sources of radioactivity (particles, fragments etc.).

A number of cases for the fuel are being studied, in which the fuel is exposed to a pressure stress for example, measuring its mechanical properties after various irradiation, thermal and other scenarios. These aim to make the back-end safe and reliable.

A whole task in SFC is devoted to accident scenarios, their consequences and their handling. For example, data from the Chernobyl disaster in 1986 is used in cooperation with our Ukrainian colleagues. It is a sad reflection of the time that these studies are more relevant than ever considering the enormous risk resulting from the nuclear power plants in Ukraine with the ongoing war.

Could you mention some substantial advantages of working in EURAD (compared to carrying out that work on a national level)? Any clear disadvantage?

Virtually all R&D in the back-end and on repositories have been and are done with international collaboration to a larger or smaller degree. Therefore, it is natural to carry out joint research in Europe, and not just sharing costs, but also skills and resources. Perhaps EURAD format had some potential, but it has not fully been taken advantage of that so far.

There can clearly be a problem accommodating the various maturity levels of the different participating countries on radioactive waste management. Luckily this matter has not been a problem in SFC; I believe it has shown the best of European competence and collaboration.

The SFC WP has been very successful in engaging with many end-users from EU-countries, but also outside of the EU. Could you mention the successful methods used to get so many end-users on-board?

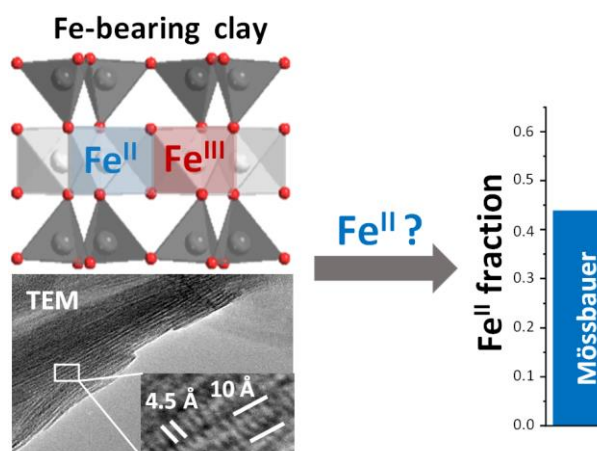
Spent Fuel Characterisation is widely followed internationally as it is usually applicable to all spent fuels in the world; I personally think it is very exciting that Europe takes the lead in such an important international project and does so in such a non-negligible way. The systematic attack on the fuel properties for the back-end has not previously been done in the way that we do it here in EURAD. This has led to a number of spin-offs; such as the IAEA Co-Ordinated Research Project (CRP) on spent fuel characterisation (chaired by myself), the working group on the decay power at NEA/OECD chaired by SFC member Dimitry Rochman and in collaboration with the American EPRI, the introduction of an e-learning module on

spent fuel characterisation in the IAEA extensive package of e-learning, and a number of updates or new creations of IAEA documents on a variety of topics in conjunction with SFC, just to mention a few. The many publications of results and invitations to conferences and meetings is an additional aspect. In other words, many actors want to be involved when new, exciting and good quality research is being done in an efficient way.

WORK PACKAGE FUTURE

Yanting Qian, a PhD student at Paul Scherrer Institute (PSI) and the university of Bern, accomplished her work within the WP 5 FUTURE on comprehensive structural characterisation of a ferruginous natural clay smectite, nontronite. Fe-bearing clay minerals present in engineered barriers and the backfill in radioactive waste repositories are critical for immobilizing redox sensitive radionuclides. Prior to the research of redox reaction, a comprehensive understanding of the clay structure from oxidizing to reducing condition is necessary. In this study, clay reduction experiments in the aqueous phase by the citrate-bicarbonate-dithionite (CBD) method were conducted, and X-ray diffraction (XRD) and transmission electron microscopy (TEM), ^{57}Fe Mössbauer spectrometry, photoelectron spectroscopy (XPS), X-ray absorption near edge structure (XANES) spectroscopy including its pre-edge, extended X-ray absorption fine structure (EXAFS) spectroscopy, and mediated electrochemical oxidation and reduction (MEO/MER) were applied to study the clay dissolution in the reduction process, revealing the structure of nontronite, and comparing the results of different methods for the measurement of the Fe redox state as a function of increasing reduction degree.

The combination of XRD and TEM analysis showed that the long-range structure of nontronite at the highest obtained reduction degree of 44% Fe(II) is not different from that of fully oxidized nontronite, except for a slight basal plane dissolution on the external surfaces. The short-range order probed by EXAFS spectroscopy suggests an increasing structural disorder and Fe clustering with increasing reduction of structural Fe. The consistent results of quantitative Fe redox state measurements with Mössbauer spectrometry, XPS, XANES, EXAFS, and MEO/MER, suggested that all methods provide reliable Fe(II)/Fe(III) ratios and can be applied to other clay samples. This work builds a good foundation for the further understanding of radionuclide retention within the WP5.



More information can be found in “Qian, Y.; Scheinost, A. C.; Grangeon, S.; Greneche, J.-M.; Hoving, A.; Bourhis, E.; Maubec, N.; Churakov, S. V.; Fernandes, M. M., Oxidation State and Structure of Fe in Nontronite: From Oxidizing to Reducing Conditions. *ACS Earth Space Chem.* **2023**”.

Figure 1. Conceptual display of the structural characterisation of Fe-bearing clay mineral

WORK PACKAGE HITEC

High level heat producing radioactive waste is generally planned to be disposed of in deep geological repositories, which contain and isolate the waste from the biosphere. The repository typically comprises a multi-barrier system: the natural geological barrier provided by the repository host rock and its surroundings, and an engineered barrier system (EBS). An essential component of EBS usually is a clay-based material, often bentonite, which has many beneficial properties like very low permeability, high sorption capacity and swelling/self-sealing capacity.

In most repository concepts the highest temperature has been limited to 100°C or less, and that is the reason for limited mechanical understanding at elevated temperatures of 90 to 150°C. A temperature over 150°C causes mineralogical changes, which can be detrimental for buffer and therefore kind of an upper limit for long term disposal (thousands of years).

HITEC studies both clay host rock and bentonite buffer. HITEC background is that proving higher temperatures than presently accepted suitable is very relevant for optimising the size of the repository and whole disposal route i.e. interim storage time. This is true even for current concepts: it increases the safety margin and gives greater credibility to the design e.g. if it is proven to work for 130°C, then for 100°C it is definitely safe from a temperature standpoint.

The overall objective is to evaluate whether an increase of temperature is feasible and safe by applying existing and within the HITEC work package produced new knowledge about the behaviour of clay materials at elevated temperatures. HITEC aims to improve understanding of the THM (Thermo-Hydro-Mechanical) behaviour of engineered clay materials (buffer) under high temperature and provide suitable THM models, both for buffer, to identify processes at a high temperature and the impact of a high temperature on the THM properties of the buffer material. The final aim is to document all the above to be used in Safety Cases studies.

HITEC mostly studies the mechanical behaviour of bentonite at elevated temperatures. These studies are carried out in three different ways. First, analysing heat treated bentonite properties and comparing these to non-treated ones. Second, measuring bentonite properties at elevated temperatures. Third, carrying out experiments at high temperatures and modelling the results.

The experimental methods used are mechanical experiments in different setups, swelling and permeability tests mostly in lab scale at elevated temperatures. The measurements at high temperatures include stress, deformation, hydraulic conductivity and temperature. These experiments are complemented by X-ray and neutron tomography. The modelling is carried out and developed by different methods to enable comparisons between different approaches.

The first results this far are the methods to carry out experiments at higher temperatures so that the required measurements including tomography can be done. As an example, for Czech BCV bentonite treated dried at 150°C, the hydraulic conductivity is over the untreated measured densities, while the swelling pressure is consistently decreasing by dried thermal treatment at the same temperature.

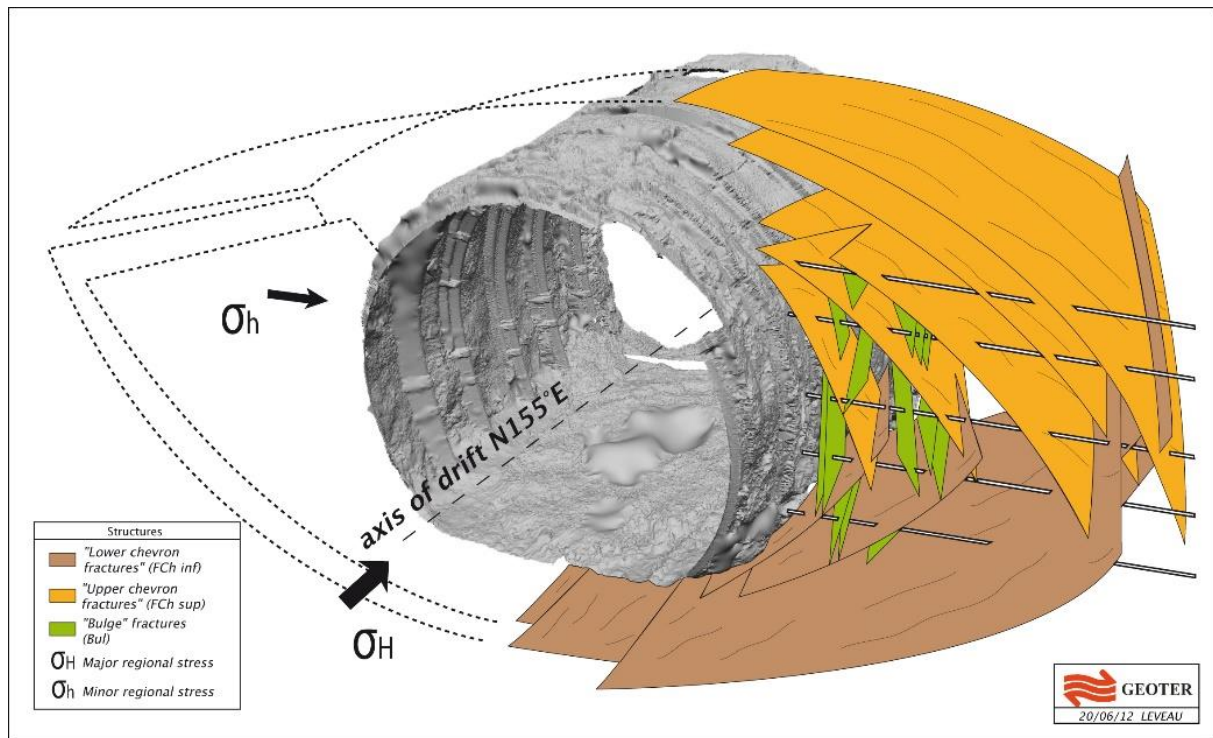


Figure 1 – Conceptual model of the excavation induced fractures network in Callovo-Oxfordian claystone (Meuse/Haute-Marne URL, HITEC SotA).

In the host clay formation task, the aim is to deploy new knowledge on the mechanics of clay in order to better evaluate and model possible damage evolution during the temperature transient phase, and better assess the consequences of a possible damage. This includes experiments, model development and model benchmarks.

The temperature rises in a low permeability porous medium such as Callovo-Oxfordian (COx) claystone, Opalinus Clay or Boom Clay generates an increase in pore pressure essentially due to the difference between the thermal expansion coefficients of water ($\sim 10^{-4} \text{K}^{-1}$) and the one of the argillaceous rock skeleton ($\sim 1.28 \cdot 10^{-5} \text{K}^{-1}$ for COx). The thermal pressurization is the key mechanism for the potential damage induced by the waste emitted heat. There is a competition between an excess of pore pressure due to the thermal pressurization and drainage, because of the gradient increase of pore pressure. With the periodic distribution of an important number of similar parallel cells and their lengths, it can be expected that the induced pore pressure between cells could not be dissipated in the horizontal direction. In the near field, the excavation of micro tunnels induces a fractured zone around them.

WORK PACKAGE SoK

STATE-OF-KNOWLEDGE: LATEST UPDATES ON KM DOCUMENT PRODUCTION

We are pleased to share the latest developments in our efforts to capture the state of knowledge. EURAD WP11 State-of-Knowledge is at the forefront of producing critical KM documents, specifically Domain Insight (DI) and State-of-Knowledge (SoK) documents. The collaboration with the PREDIS project plays a key role in generating the documents linked to Theme 2 – Pre-disposal.

To date, we have two SoK and seven DI documents that are accessible through various platforms, including the EURAD webpage, Zenodo, ProjectPlace, and the IAEA's INIS repository. With over 300 downloads (Zenodo and ProjectPlace stats, not including here IAEA and EURAD page), their relevance in the RWM community is evident. WP11's unique approach has gained recognition from KM experts, with the OECD/NEA EGKM writing a DI document on Information, Data, and Knowledge Management (IDKM) (Domain 7.2.2).

Several DIs, including Domain 1.1.2 – Timetable for decision making; Domain 3.1.2 – Vitrified HLW; Domain 3.4.1 – EBS Systems; the Domain 7.2.2 – IDKM, are ready to be released, however a new feedback feature on the EURAD website will be first introduced (see <https://tally.so/r/woeZEX>). Soon, you will have the opportunity to provide feedback right next to the download links for each KM document available in the Roadmap. Your insights are highly valuable to us!

Thank you for your continued support. Stay tuned for more updates on our KM journey!



A look back

COURSE on “Multiphysics and multiscale coupled processes in geomaterials. Focus on thermal effects and gas transfer impact on the behaviour of geomaterials.”

The **second GAS/HITEC Joint training course** was jointly organized with ALERT geomaterials network (the Alliance of Laboratories in Europe for Education, Research and Technology) between 28 August and 1 September 2023 at the University of Liège (Belgium).



Picture of participants to the doctoral school

Geomechanics plays a significant role in the understanding of the multiphysics and multiscale processes taking place in a geological disposal facility for radioactive waste. The objective of the school was so to introduce state-of-the-art understanding, concepts and methods related to thermo-hydro-mechanical coupled processes, the physical impacts of thermal loading and the mechanistic understanding of gas transport in clayey materials. Results arising from the EURAD project were integrated to the school, and a half day was dedicated to presentations by early-career researchers. A visit to the HADES Underground Research Laboratory was organized on the last day of the school.

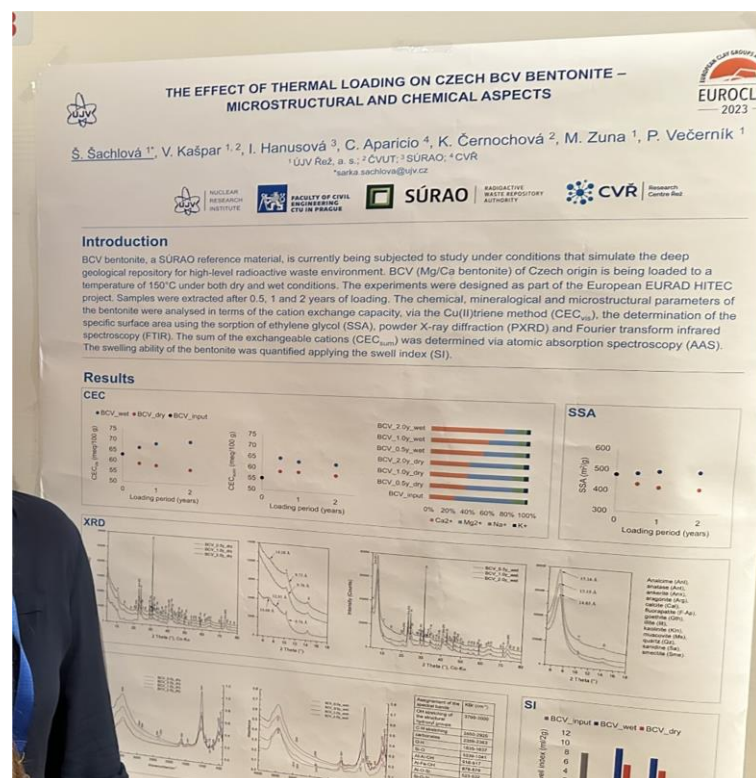
64 participants followed these 5-days doctoral school bringing together two communities active in geomechanics. A great success!



A look back

HITEC at EUROCLAY2023

An oral presentation about HITEC was given by WP Leader Markus Olin et al. at the Euroclay2023 (<https://euroclay.aipea.org/>) conference in Bari in July 2023 (Fig. 1). In addition to that presentation HITEC's results were presented in posters like the one by Š. Šachlova et al. (Fig. 2). High (outdoor) temperature was an acute issue in Bari during the conference – the common afternoon temperature was over 40 degrees.



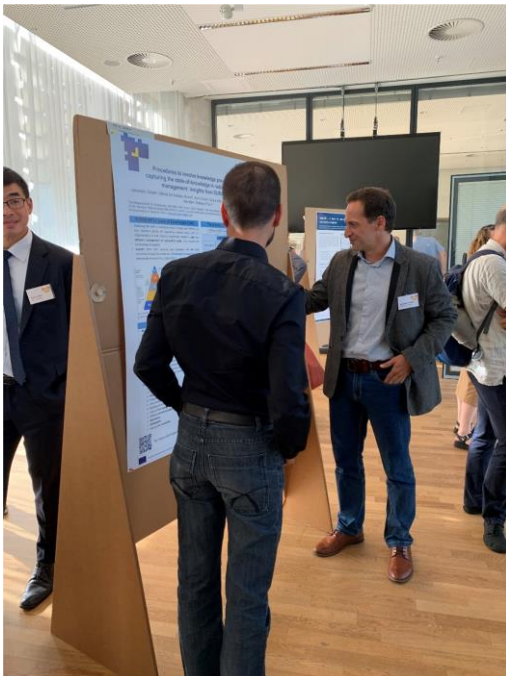


A look back

SAFE ND 2023 Conference

EURAD WP11 STATE-OF-KNOWLEDGE PARTICIPATION AT SAFEND 2023

“Several EURAD Work Packages presented their outcomes at the **international research symposium safeND** on the safety of nuclear waste management, organised in Berlin from September 13th to 15th 2023 **by the Federal Office for the Safety of Nuclear Waste Management (BASE)**. These contributions were amongst others oral presentations from WPs UMAN and MODAT as well as poster from WP SoK. The topic addressed in this year’s symposium was "Research for resilient safety: Gaps, Progress and Priorities". More information on this event can be found [here](#).”



During the symposium, WP11 leader Alexandru Tatomir (alexandru.tatomir@bge.de) presented the work on "Procedures to involve knowledge providers for capturing the state of knowledge in radioactive waste management: insights from the European Joint Programme on Radioactive Waste Management" (<https://doi.org/10.5194/sand-2-225-2023>).

We focused on showing the critical task of engaging the knowledge providers in capturing the State of Knowledge (SoK) in radioactive waste management (RWM). We discussed the challenges and best practices we have encountered in involving experts and sharing knowledge effectively. EURAD KM is committed to strengthen the connection with the experts, encourage sharing of knowledge, and update KM documents as new knowledge emerges.

The upcoming SafeND Symposium will take place again in Berlin in 2025.



A look back

EURAD-PREDIS SUMMER SCHOOL ON WAC

EURAD-PREDIS JOINT SUMMER SCHOOL ON WASTE ACCEPTANCE CRITERIA (WAC)

From September 4 to September 8 2023, the **Summer School** on “*Waste Acceptance System, a Tool to Facilitate the Safe Storage, Transport, Packaging and Disposal of Radioactive Waste*”, a **joint EURAD-PREDIS training course**, was organised at Research Centre Řež in the Czech Republic.

The Summer School was organised to present a **comprehensive overview of the development and implementation of Waste Acceptance Systems**. The Summer School included 19 lectures, two excursions to a waste processing facility and a near surface repository, and an exercise to revise the knowledge gained during the course.

The lectures aimed to **explain the fundamentals of Waste Acceptance Systems, their link to the radioactive waste management lifecycle, and principles of their creation and use**. The theoretical lectures were supported by the description of the application of Waste Acceptance System in 7 European countries with established acceptance systems. Finally, the exercise consisted of three tasks allocated to separate groups of participants aiming at proposing WAS for very low level waste, legacy waste, and new waste type (geopolymers). Each group presented outcomes of their proposals and they were discussed in the final plenary session.

39 people participated to this Summer School (11 participants from EURAD, 12 participants from PREDIS, and 16 participants not actively involved in EURAD nor PREDIS). Preliminary feedback from the participants is very positive. EURAD WP13, PREDIS WP3, and the local Summer School organisers are pleased with the results and collaboration on this joint Summer School.

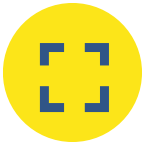


A look back

DONUT ANNUAL MEETING

From June 29 to June 30, we were not eating DONUT but rather discussing the work carried out in the DONUT (Development and Improvement of Numerical methods and Tools for modelling coupled processes) work package. Glad to see lively discussions about high performance computing, upscaling, uncertainties modelling, machine learning and code benchmarking. Thank to everyone involved in DONUT!





Focus on the RICOMET event

On the morning of September 1st 2023, the EURAD programme was invited to the **RICOMET event** as a contributor. The RICOMET conference, that took place at the Tabloo visitor center in Dessel, Belgium, is the **main European gathering on social science and humanities research in ionising radiation, involving more than 100 social science researchers and key stakeholders**.

The contribution for the EURAD programme was included in a session that aimed at **bridging the Social Sciences and Humanities (SSH) and Natural Science perspectives** in research and innovation, implying contributions, experiences, challenges and lessons learned from SSH in different projects. This contribution was made by one NTW partner.



There was of course no presentation of EURAD social science activities, as there are none in the programme. Instead, the input from EURAD's activities was the **testimony regarding Interactions with Civil Society (CS) and its outcomes in the programme so far** : CS members organized 14 workshops or seminars, participated into 26 other EURAD events, contributed to 10 Deliverables and to dozens of Milestones, organized 7 PEP sessions, presented works in 2 EURAD training courses, 2 Lunch-and-Learn Sessions, and much more activities.





Now published

DONUT – Report describing the benchmarks to be carried out during the WP (D4.4) – [Link](#)

UMAN

- Training Materials (D10.1) – [Link](#)
- Uncertainties relevant to the safety case (D10.5) – [Link](#)
- Views of the different actors on the identification, characterisation and potential significance of uncertainties (D10.6) - [Link](#)

State-of-Knowledge

- Feedback mechanism for Domain Insights and SoK documents – Methods and results (D11.10) - [Link](#)
- Domain Insight - International Cooperation (1.3.3) – [Link](#)

Training – Alignment of the available course material with the Roadmap (D13.3) - [Link](#)

Several open publications linked to EURAD work packages are also available under the Publications section on [EURAD website](#):

- Finite element modelling of multi-gas flow in expansive clay
- Implementation and validation of pressure-dependent gas permeability model for bentonite in FEM code Thebes



Upcoming events

OCTOBER

- 03-05:** [Symposium on Gas migration in geomaterials – SEG23](#)
- 03-06:** [International Conference on Environmental Remediation and Radioactive Waste Management 2023](#)
- 24-26:** [DigiDECOM 2023](#)

NOVEMBER

- 08-10:** [Workshop assessing the long-term evolution of engineered barrier systems of waste disposal systems](#)
- 14-16:** [DECOVALEX 2023](#)
- 20-24:** [6th International workshop on Mechanisms and Modelling of Waste/Cement Interactions](#)
- 28-30:** [ROUTES Workshop on SIMS and LIMS interaction](#)

SAVE THE DATE: November 24-29 2024

**INTERNATIONAL CONFERENCE IN RADIOECOLOGY &
ENVIRONMENTAL RADIOACTIVITY IN MARSEILLE, FRANCE**



“Join us for the highly anticipated 6th edition of the **International Conference on Radioecology & Environmental Radioactivity (ICRER)**, taking place from **November 24 to 29, 2024**, in the charming city of **Marseille, France**.

This prestigious event, jointly organized by the **Institut de Radioprotection et de Sûreté Nucléaire (IRSN)** and the **Norwegian Radiation and Nuclear Safety Authority (DSA)**, is making a welcome return only two years after its last edition. It promotes **reinvigorating invaluable interactions within the radioecology community**.

In an era of transformative technological advancements, we're delighted to introduce at ICRER 2024 **discussions on cutting-edge topics** such as big data and climate change, in addition to the traditional themes of radioecology and environmental radioactivity (environmental monitoring, NORM, nuclear legacy, human and environmental dose assessment, transfer modelling).

Get ready to **connect with experts, share innovative ideas, and build partnerships** that will influence the future of radioecology and more!”

Save the date: November 28-30 2023

ROUTES Workshop on SIMS and LIMS interaction in Lisboa, Portugal



The EURAD ROUTES WP is organising its **second Workshop on SIMS** (small inventory member states) **and LIMS** (large inventory member states) interaction to take place from Tuesday, November 28th to Thursday, November 30th, 2023, in Lisbon, Portugal. This workshop aims to **disseminate the results of ROUTES Task 8 on waste management solutions** for member states without waste acceptance criteria (WAC) and with small inventories, as well as to **facilitate knowledge exchange between SIMS, LIMS and the civil society**. This workshop is open to all partners from EURAD and other interested parties.

Additionally, this workshop includes a half-day introductory session for students-only, and dedicated students' sessions throughout the workshop tackling the challenges of waste management for small inventories. EURAD students remain warmly welcome. Funding can be provided by ENEN, which supports training and mobility actions

The **registration link** will be included in the event-post on the EURAD webpage next week ([ROUTES Workshop on SIMS and LIMS interaction | EURAD \(ejp-eurad.eu\)](#)).

Save the date: 16th – 18th January 2024

EURAD Training on Requirements Management Systems

Hungary, Mercure Budapest Castle Hill (<https://all.accor.com/hotel/1688/index.en.shtml>)

The EURAD guidance work package (WP12) aims at **developing a comprehensive suite of instructional guidance documents** that can be used by EU Member-States and associated countries with radioactive waste management programmes, regardless of their phase or level of advancement with implementing their waste management activities. Requirements management has been selected as the broad topic for further guides to be developed within EURAD. To effectively support the understanding of the application of requirements management systems (RMS) in radioactive waste management (RWM), a training session is going to be organised in collaboration with EURAD WP13 (focussed on training). During this two and a half days long training, participants will **learn about the basics of RMS, its role in planning RWM programmes and some lessons learnt from application of RMS in some national programmes will be shared**. Theoretical lectures and the introduction of the results of the literature survey on RMS are complemented with exercises and test cases.

This Training Session targets junior and senior professionals from the EURAD programme working on - or just starting the introduction of - RMS. The Training Session provides a platform for the participants for networking and aims to assist the creation of an informal “community of practice” in the area of requirement management.

The aim of the Training Session is to **provide input to 'the way of thinking' on**

- how to structure the RMS,
- the process of developing and updating the RMS and
- using the RMS in the daily work.

No prerequisites apply for this Training Session.

[Click here](#) to download a preliminary programme.

*Please be informed that this is a **face-to-face training course with limited seating**. Therefore, the organisers ask participants to **only register if they intend to attend** the Training Session. Preference for attendance will be given to EURAD consortium members.*

NEWS ABOUT EURAD-2



It's been a busy summer for the radioactive waste community!

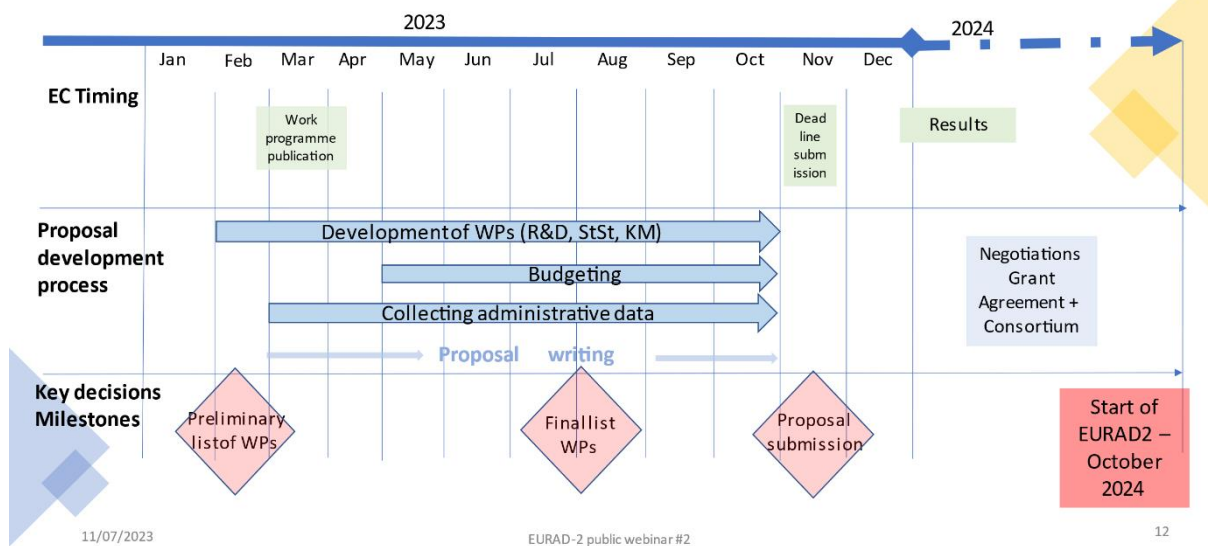
Following the publication of the 16 work packages selected to continue their development within the framework of EURAD-2, the WP Preparation Teams worked hard during summer to provide the technical descriptions and budget estimates for their WP.

Each WP Preparation Teams received feedback from the Core Group to ensure a high-quality proposal. They are now in the last steps of finalising the descriptions that will be included in the final proposal to be submitted to the European Commission.

The proposal describing the general concept of EURAD-2, the Knowledge Management and the R&D work packages and Strategic Studies will be submitted on November 8th for European Commission evaluation.

Take a look at the timeline for EURAD-2 below!

Moving forward EURAD-2 – Timeline – 1/2





Follow us for the latest news!



eurad



Miha Hren • 3e et +
Researcher at ZAG
2 sem. • Modifier •

+ Suivre ...

Our visit at the **The University of Manchester** came to close on Friday as we did our last CT scan at **NXCT**. The Electrical resistance sensors were left in safe hands at **Dirk Engelberg**'s corrosion laboratory, where the measurements will continue for about 6 months before me and **Bojan Zajec** return for another week of CT and electrochemical measurements. Thanks again to the **European Joint Programme on Radioactive Waste Management** cross WP mobility grant that made this trip possible, **Jiaqi Xu** for assistance with the CT measurements, and **Dirk Engelberg** for hosting us during our beautiful and sunny Manchester stay.

#EURAD, #Mobility, #Nuclearwaste, #corrosion



Nicolas Seigneur • 1er
Research Assistant at Mines ParisTech, Centre de Géosciences.
2 sem. • Modifier •

I never thought I'd publish a research article including micromechanics. However, thanks to the **European Joint Programme on Radioactive Waste Management**, specifically its work package **MAGIC (Alexandre DAUZERES)**, we were able to conduct this exciting research which just got published in a Nature Portfolio Journal. I'm very proud of this one which potentially unlocks many modelling opportunities in the future. This would not have been possible without the support from the European Commission.

check it out:

<https://rdcu.be/dhUDn>

Special thanks to my co-authors (**Benoît Bary** and **Stéphane POYET**) and congratulations to **Adrien Socié**, my previous postdoc, for his outstanding work!

Voir la traduction

Vous et 90 autres personnes

1 commentaire • 2 republications



Abhishek Gupta • 2e
Doctoral Researcher at Aalto University School of Science and Technology
1 mois • Modifier •

An exciting moment for me to present our paper, "Finite Element Modelling of Multi-Gas Flow in Expansive Clay (<https://lnkd.in/dWRJAQcT>)," co-authored by Dr Elke Jacobs (PhD), Dr Ayman Abed (PhD) and Dr Wojciech Solowski (PhD), at the NUMGE 2023 conference held at Imperial College London. During the presentation, I also discussed the capabilities of our FEM code, Thebes, in modelling multi-gas flows under thermal-hydro and mechanical conditions for the **ONDRAF/NIRAS Belgian Agency for Radioactive Waste and Enriched Fissile Materials** conceptual nuclear waste repository design. Additionally, I talked about the potential future applications of code THEBES in simulating radionuclide flows and geological energy storages involving H₂ or CO₂.

I am sincerely grateful to Prof. Dr Lidija Zdravkovic (PhD) and the entire organizing committee for this remarkable opportunity. The conference also provides a great platform to learn more about up-and-coming research.

Furthermore, our paper highlights the collaborative efforts between **SCK CEN** and **Aalto University** under the EURAD mobility program. My visit to SCK CEN last September helped me gain valuable insights into innovative gas and radionuclide transport experiments conducted in clays. Moreover, I had the opportunity of receiving a technical tour of **HADES**, a 200 m deep underground laboratory in Boom Clay, dedicated to studying the transport properties of various species in conditions closely resembling those of an actual repository. I would like to express my deep gratitude to **Dr Elke Jacobs** and **Dr Norbert Maes** (PhD) for making my research visit to SCK CEN immensely worthwhile. The below images provide highlights of the conference (left) and my visit to SCK CEN (right).

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