

EDITO



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The second quarter of 2026 proved to be particularly busy, and the publication of the June newsletter was therefore postponed to the beginning of the third quarter. We hope you will enjoy this opportunity to look back on the past six months of the Partnership and the key achievements accomplished during this period.

At the time of publication, we are fully engaged in the final preparations for our second Annual Event, which will take place in Dublin from 8 to 10 September 2026. We look forward to sharing highlights and outcomes from this event in the next newsletter.

As EURAD-2 approaches its mid-term, we are also preparing to welcome new Work Packages and topics, which will officially begin in October 2026.

**CONGRATULATIONS!**

Andrea Capuano graduated in Nuclear Engineering at POLIMI (March 2026) with a thesis entitled “A New Selective Extraction Chromatography Resin for the Radioanalytical Characterization of Molybdenum”, advisor: E. Mossini, co-advisors: G. Magugliani, M. Mariani.

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Our community thrives thanks to the people who put their time and energy into making a difference. This section is dedicated to celebrating their contributions and expressing our gratitude. We would like to acknowledge:

- **Simona Sandalova** and **Hanna Rostova** who have stepped up to lead the Young Generation group and done a great job hosting discussion groups to expand the involvement of people and scope.
- All people involved in the preparation of the second wave submission for their hard work that allowed made it possible to submit the proposal on time. Special recognition goes to the **Work Package Coordination Teams, Bureau members, and PMO colleagues** for their outstanding commitment throughout the process.
- All of the **Strategic Study leaders and WP leadership teams** from wave 1, for the work done in navigating this new type of work package and getting your outcome reports prepared.
- A special thank you to **Valéry Detilleux** for his availability and support during the preparation of the second wave proposal, even late in the evening during halftime of World Cup matches.
- Thank you to Louise Théodon and Andra staff for finalising the second wave submission in good time and in a professional manner. A huge accomplishment, especially sorting out all the budget calculations of combining the first and second waves.

WP Leader interview

Rékà Szőke (HUN-REN EK, Hungary), DITOCO2030 WP Leader



During the summer of 2026, I transitioned from IFE in Norway to my current position in Hungary. The work was carried out during my employment at IFE. IFE's commitment to the digitalization topic has been demonstrated through both its active engagement and its own financial contribution to the work package. This support has been valuable in advancing the objectives and activities of the WP.

How did leading a Strategic Study differ from leading a more traditional R&D work package?

Leading a Strategic Study was quite different from leading a traditional R&D work package. In a traditional R&D work package, the work is usually centred on running experiments, developing models, data analysis, or building a specific system. With DITOCO2030, we had to take a step back. Our job was to identify the gaps and challenges, bring together existing knowledge, combine diverse expert perspectives, find opportunities and translate them into clear, actionable recommendations for future research and the wider radioactive waste management community. This also changed my role as a WP leader. I had to focus much more on understanding end users' needs, as well as Member State and institutional perspectives, while fostering a shared strategic direction.

In what ways has your previous experience, for example as technical coordinator of the HARPERS project, prepared you for or influenced your leadership of DITOCO2030?

My experience as Technical Coordinator of the EURATOM HARPERS project was particularly valuable. That role required working across disciplines, organisations, and national contexts, teaching me how to maintain technical coherence while ensuring all partners understood their contribution to the overall objectives. This experience influenced the way I worked in DITOCO2030. I made it a priority that the WP is seen as a platform where experts could bring their specific knowledge and institutional perspectives, while shaping the different inputs into a unified, strong message rather than a collection of separate pieces. My broader background in international project management also helped me ensure that the DITOCO2030 deliverables were not perceived as a simple summary of existing gaps, knowledge, and opportunities. Instead, they were received as actionable recommendations for policy makers and end-users, while clearly highlighting future R&D needs and preparing the radioactive waste management field for the years ahead.

What motivated you to take on the leadership of this work package?

I was motivated by the chance to work on a fast evolving topic that connects science, strategy, and real-world implementation. Radioactive waste management demands technically excellent research that also stays relevant to long-term safety, national programmes, and policy decisions. DITOCO2030 gave me the chance to contribute to that bigger picture. I particularly liked the challenge of bringing together different partners and perspectives and helping to turn diverse views and needs into a clear, forward-looking message. This kind of work is demanding, but it is also very meaningful and rewarding. The role also aligned closely with my professional interests and offered an excellent opportunity for continued learning and growth in an increasingly important field.

What specific challenges in radioactive waste management did DITOCO2030 seek to address?

DITOCO2030 focused on understanding the gaps, challenges, and opportunities around using digital twins in radioactive waste management. We looked at how they could improve optimisation,

construction, operation, long-term stewardship, safety assessment, and decision-making. As an emerging technology in our field, digital twins raise important scientific and practical questions around common definitions, regulatory acceptance, integration of legacy data and systems, long-term data management, model credibility and validation, cybersecurity, traceability, and sustainability over decades. These are not only technical issues, but they also impact how organizations, regulators, and Member States can develop confidence in digital approaches for the future.

What are the key findings of DITOCO2030 that you believe should be incorporated into future research programmes and/or policy development

One of the most important messages is that future research must remain strongly integrated and cross-disciplinary. Digital twins will only deliver real value if they successfully combine data, models, infrastructure, safety assessment, and decision-making in a coherent, traceable, and regulatorily acceptable manner. Equally important is that future research priorities should be actual end-user driven and shaped around practical implementations. DITOCO2030 clearly showed that digital twins should not be viewed only as a technical innovation. When properly developed, they can significantly support knowledge management, stakeholder communication, safety assurance, planning, construction, operation, and long-term decision-making. The WP also underlines the need for stable, long-term support, along with clear governance structures and robust connections between research, implementation, and regulatory requirements.

What has been the most rewarding aspect of leading DITOCO2030?

DITOCO2030 dealt with a fast-developing area, and it was important to recognize that digitalisation in radioactive waste management is not simply technical trend, but raises questions of trust, regulatory acceptance, long-term data management, knowledge preservation and implementation. The most rewarding part was seeing how these various dimensions (technical, regulatory, organisational, and societal) come together into a shared strategic output that is relevant to the entire radioactive waste management community and diverse stakeholders. On a personal level, it was a fantastic opportunity for continuous learning and professional growth through collaboration with experts from many diverse backgrounds.

As the work package comes to an end, what message would you like to share with the EURAD-2 community and its stakeholders?

I would like to stress that DITOCO2030 should not be viewed as an endpoint, but as a valuable contribution to the next phase of the EURAD programme. The short- and long-term recommendations we developed require continued R&D, strong interdisciplinary collaboration, openness, and sustained scientific effort. For EURAD-2, it will be essential to maintain an integrated, cross-disciplinary approach. We need excellent science that directly addresses real-life gaps and support Member States at different stages of their national programmes. I also want to highlight the tremendous value of the EURAD community itself. Its strength lies in bringing together diverse organisations, countries, and areas of expertise. If we continue to use this diversity constructively, we can develop a research agenda that is both scientifically excellent and strategically relevant for the safe and responsible management of radioactive waste.



ASTRA 3+1 Workshop

Report by Gabriele Mraz and Alexis Geisler-Roblin, photos by Petar Khardzhilov and ARAO

The ASTRA 3+1 workshop for interaction of civil society with the three technical colleges took place from 27 to 29 May 2026 in Ljubljana at EIMV premises. It was organized by the ASTRA task 6 team, NTW and EIMV. 21 participants were on site, and 10 online. The participants came from all technical colleges, from end-users, and civil society experts from ASTRA and from the civil society larger group.

The workshop was structured in three sessions: 1) challenging waste, 2) alternative facilities and 3) intergenerational dimensions. Each session was a dialogue between the technical outcomes and results from ASTRA Tasks 3-4-5, and questions and cases raised by civil society members from EURAD-2 and from third wing.



Workshop in EIMV facilities in Ljubljana.

The technical presentations from Tasks were made by COVRA, EIMV, SSTC NRS and EGIS, in order to highlight the main results of the WP regarding SIMS issues about challenging waste, long-term interim storage and deep borehole disposal. Several case studies were presented by civil society members:

- French public debate about RWM, (Alexis Geisler-Roblin, CNDP)
- legacy of 47 uranium mines in Bulgaria (Petar Khardzhilov, NTW)
- closed uranium mine and issues for final repository search in Pécs/Hungary, (Jozsef Kobor, Green circle of Pécs)
- Soviet nuclear legacy in Northern Russia (Dmitry Gorchakov, Bellona)
- transboundary problems between Bosnia & Herzegovina and Croatia in the site selection process for the Croatian LILW repository and (Mario Crnkovic, Green Team)

- problematic incineration of radioactive waste from Italian NPP Caorso in Slovakia (Michal Daniska, Chceme zdravu krajinu)

The last session of the workshop about long-term governance and intergenerational stewardship culture was more interactive, as it was mainly structured through working groups and as it also gave the opportunity to French students not from EURAD-2 to share their thoughts on intergenerational considerations. In addition to this contribution, Slovenian students were also introduced to the main questions of the workshop through a dedicated PEP session before the start of the workshop.



A group students working at PEP dialogue tool

On the last day of the workshop, there was a technical visit at the site of the closed uranium mine Rudnik Žirovski vrh, thanks to the support of ARAO, where are managed the Jazbec mining tailings landfill and the Boršt hydrometallurgical tailings landfill, both environmentally rehabilitated, yet Boršt site faces a landslide problem.

The workshop got very good feedback, participants liked having enough time for questions and discussions. A special thanks to all contributors and EIMV for hosting, and ARAO for the technical visit!



The technical visit to closed uranium mine Rudnik Žirovski vrh, here on the top of Jazbec mining tailings landfill.



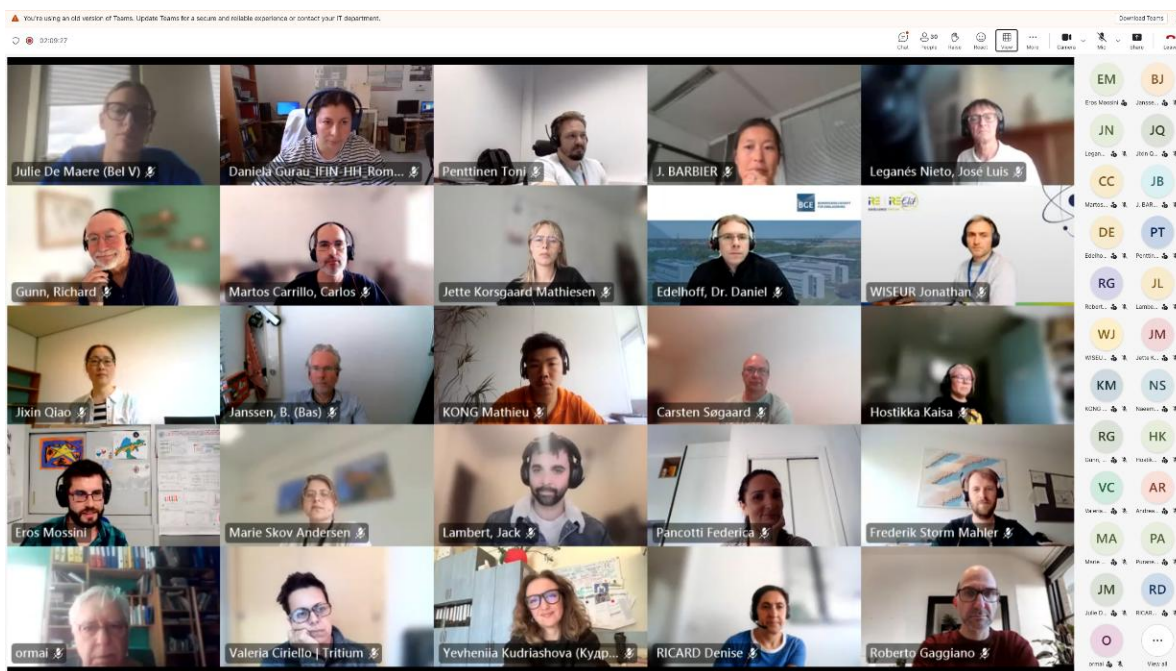
ICARUS Annual meeting

The in-person annual meeting of WP5 ICARUS was held at Jozef Stefan Institute Reactor Centre - Ljubljana on April 28 – 29, 2026. During the meeting, the tasks' main outcomes were reported and the next activities to meet the needs of relevant decommissioning scenarios were planned. Here is a snapshot of some topics covered during the technical sessions:

- practical demonstration of the centralized Data Management tool under development;
- detailed explanation of the Non-Destructive Techniques (NDT) use cases and systems under investigation for open geometry gamma, closed geometry gamma, and neutron-based characterisation;
- benchmark between different NDT like ultrasound and tomographic gamma scanning systems for determining physical properties, such as density and voids distribution;
- cross-comparison between the radiochemical protocols under development for Difficult to Measure (DTM) radionuclides, in terms of accuracy, cost, time, simplicity, detection limit;
- pros and cons of new radiometric and non-radiometric measurement approaches;
- definition of the practical details and discussion of the performance indicators for the intercomparison exercises for validating the new methods for DTM radionuclides;
- evaluation of the modelling and statistical schemes implemented within theoretical and statistical Scaling Factors (SF) approaches;
- comparison between theoretical and statistical SF approaches to understand the impact of data and model uncertainties at waste package and disposal inventory levels.



The on-line meeting with ICARUS End Users and Stakeholders was held on June 9, 2026. Several practical on-going activities about Non-Destructive Techniques, Destructive Techniques, and Scaling Factors for physical, chemical, and radiological characterization of radioactive waste were presented. 24 people from 16 End Users and 2 Stakeholders actively participated to the meeting. Their needs were collected and several opportunities for their direct involvement were discussed, such as use cases for relevant decommissioning scenarios, data management platforms, intercomparison exercises on new radiochemical protocols, education and training events, and the next EURAD-2 Annual Event.





STREAM in Action: Highlights from the 2026 Annual Workshop and EU-SH Exchange

On 21–22 May 2026, the EURAD-2 WP6 STREAM (Sustainable TREATment and iMmobilisation of Challenging Waste) Annual Workshop took place in Brussels, with local organisation by SCK CEN, bringing together partners for two days of engaging technical exchange and dynamic discussions. This first in-person workshop provided an important opportunity to **review progress achieved, showcase preliminary results, and strengthen collaboration** across the consortium.



The programme covered all major STREAM activities, including:

- **Treatment optimisation and conditioning methods** for challenging waste streams
- Development of **innovative and sustainable matrices**, such as geopolymers, MKPC and low-carbon binders
- **Scaling-up of treatment and conditioning processes**
- Assessment of **cost and environmental performance**, in line with circular economy principles, including Life Cycle Assessment (LCA) approaches

The workshop also fostered **interactive discussions and knowledge exchange**, enabling participants to align ongoing work, identify synergies, and define priorities for the next phase of the project.

Beyond the technical programme, the event reinforced the importance of building a strong and collaborative community within STREAM and across EURAD-2, including engagement with the Young Generation.

With the next three years ahead, the outcomes of the workshop will support the continued development and optimisation of innovative solutions for the safe and sustainable management of challenging radioactive waste streams.

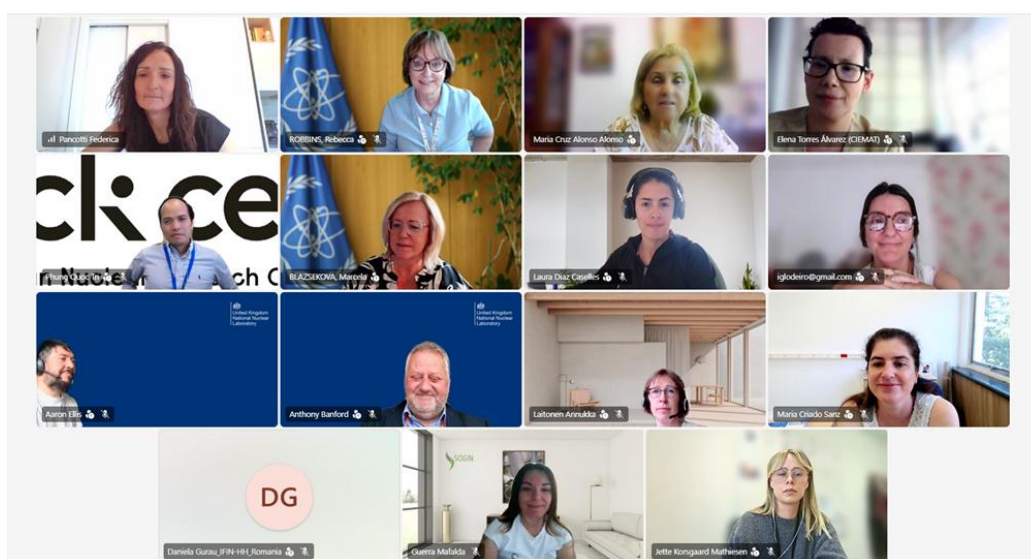


Annual EU-Stakeholder Workshop 2026

On 4 June 2026, the Annual EU-SH Workshop was held online, as an opportunity to present STREAM progress and gather direct feedback from End Users and Stakeholders. The discussion highlighted priority needs in areas such as training, Waste Acceptance Criteria, characterisation and conditioning, while also confirming interest in the pre-disposal training portfolio.

Technical updates covered progress on treatment processes, innovative conditioning matrices, scaling-up activities, and the integration of Life Cycle Assessment, Life Cycle Costing and disposability considerations.

The workshop also served to introduce the planned Pre-Disposal Topical Session 5 of the second EURAD-2 Annual Event, with follow-up input from End Users and Stakeholders expected to support preparation of the session.





Hands-on learning at the Geopolymers Training Course

A dedicated training course on geopolymers was successfully delivered on 18–20 May 2026 at SCK CEN (Mol, Belgium), as a joint initiative of the EURAD-2 pre-disposal Work Packages—**WP5 ICARUS, WP6 STREAM, and WP7 L'OPERA**. The course brought together 20 participants, with strong involvement from the EURAD-2 Young Generation, and provided a structured and highly interactive learning experience combining lectures, laboratory sessions, and practical demonstrations.

The programme opened with introductory sessions on geopolymer science and applications, including lectures by **John Provis (PSI)** on fundamentals and **Milan Touš (SURAO)** on waste immobilisation, followed by a session on geopolymer characterisation delivered by **Lander Frederickx (SCK CEN)**.



The second day focused on **hands-on laboratory activities**, including formulation, casting, and testing of geopolymers, as well as a group-based competition. Participants worked in teams under the guidance of **Quoc Tri Phung and Eduardo Ferreira (SCK CEN)** and other experts, performing mechanical and mineralogical characterisation and analysing experimental data.

The final day addressed key aspects of **upscaling and advanced testing**, with sessions on scale-up principles, drum-scale mixing demonstrations, and non-destructive testing (NDT) techniques. These activities, led by SCK CEN experts and **Bas Janssen (NRG Pallas)**, provided participants with practical insight into the transition from laboratory research to industrial application.

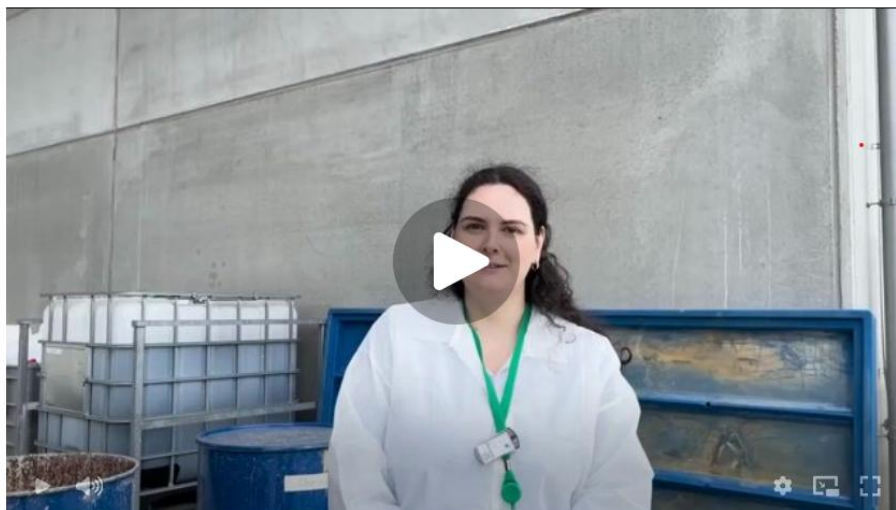


A highlight of the course was the **team-based geopolymer competition**, where participants designed, produced, and evaluated their own formulations. This exercise illustrated the need to balance key performance parameters such as workability, strength, and heat release, while comparing results with a reference formulation.

Overall, the training confirmed the strong potential of geopolymers as alternative materials for radioactive waste management and highlighted critical factors such as mix design, curing

conditions, and testing strategies. It also provided valuable insight into scaling challenges and the implementation of innovative solutions. Feedback from participants was very positive, particularly regarding the hands-on activities, scaling-up demonstrations, and interactive format.

Watch the [video](#) on the Geopolymers training - @SCK CEN



ANCHORS-OPTI Joint Workshop

On 2 April 2026, the ANCHORS-OPTI Joint Workshop was held directly after the ANCHORS workpackage meeting. The workshop took place in a hybrid format. Most ANCHORS partners were still on site in Prague, while the OPTI partners joined mainly online.

The workshop featured six presentations and opened with an overview of the WP OPTI. The strategic study OPTI, now in its second and final year, presented the main outcomes of the green and white papers. The focus was placed on backfilling and closure, both identified as key topics for optimization and both are of interest in WP ANCHORS as well.

The R&D work package ANCHORS, running over five years. Insights in the status of the different tasks were given. The key uncertainties in experimental data and material heterogeneity were highlighted. In addition, the ANCHORS team presented the structured ANCHORS database developed to support optimization efforts.

Posiva shared experiences and lessons learned from implementing optimization in their program. It was concluded that driver for optimization is often feasibility, necessity or optimization of overall safety. However, there is no need to fear changes but everything needs to be ready before changes are implemented. From a regulatory perspective, FANC (Belgium) provided insights into how optimization is viewed by regulators. Finally, NTW, representing civil society, contributed perspectives on how optimization is perceived outside the technical community.

The workshop concluded with a short discussion and a wrap-up, emphasizing the value of continued collaboration between the two work packages.



CLIMATE Annual meeting and Training Session

The 3rd CLIMATE Annual Meeting took place on 23–24 June 2026 in Caen, France, bringing together project partners to exchange knowledge and reflect on the progress achieved across the Work Package. The meeting featured presentations and discussions on methodologies, key results, and lessons learned from the different technical tasks, fostering dialogue on climate change considerations in radioactive waste management. Participants also visited the Manche disposal facility (CSM) in La Hague, gaining first-hand insight into the site's long-term monitoring and climate adaptation measures. The meeting provided a valuable opportunity to share experiences, strengthen collaboration, and consolidate the outcomes of the WP as it approaches its conclusion.



CLIMATE Training Session – Impact of Climate Change on Radioactive Waste Management

The EURAD-2 WP11 CLIMATE Online Training Sessions took place on 19–20 May 2026, bringing together participants from across the radioactive waste management community for two half-day sessions on the impacts of climate change. Designed for both newcomers and experienced professionals, the training covered climate fundamentals, modelling approaches, and methodologies for assessing climate change impacts during operational and post-closure phases of radioactive waste management. Advanced sessions explored key processes such as erosion, groundwater flow, radionuclide transport, and long-term landscape evolution, providing participants with a comprehensive overview of current scientific approaches and their application to safety assessments.



Through the lens

Radchem 2026 Conference – (May 2026)



Mojmir Nemec (CTU) organized and chaired the 20th edition of the Radchem Conference:
<https://www.radchem.cz/index.php>.

Jixin Qiao (DTU) was invited speaker with an inspiring presentation on mass spectrometry challenges. Eros Mossini (POLIMI), Gabriele Magugliani (POLIMI), Marko Strok (JSI), and Filip Babčický (CTU) presented their research activities carried out in ICARUS, with focus on new radiochemical protocols development and validation. The book of abstract is available here:
https://indico.fjfi.cvut.cz/event/361/attachments/2047/6272/sbornik_errata_20260508.pdf

WP Knowledge Management – Recent progress and planning for Years 3-5

The first half of 2026 has been a productive period for EURAD-2 Knowledge Management (KM), with new knowledge documents published, dissemination and Lunch & Learn sessions organised, and preparations advanced for the next phase of the programme.

During the past months, the KM Board worked on updating the KM programme for EURAD-2 Years 3–5, covering the period from October 2026 to September 2029. Building on lessons learned during the first two years, the updated programme will continue successful existing activities while responding to emerging priorities across the EURAD-2 community.

A dedicated planning webinar was held on 29 April 2026, providing partners with an opportunity to review the proposed scope and priorities for Years 3–5. Participants contributed through polling, plenary discussion and breakout groups, considering whether the proposed programme addressed the most important KM needs and where activities should be further developed.

Similarly to Wave 1, the KM activities embedded in the technical WPs are coordinated under Task 6 of WP2 KM. Within each technical WP, the Task 2 Leader also acts as the KM Ambassador, coordinating the WP's KM contributions and providing the link to the KM Board. **Task 2.1** covers the preparation of initial and final State-of-the-Art reports in the R&D WPs, and Green and White Papers in the Strategic Studies WPs. **Task 2.2** covers wider knowledge-transfer activities, including Domain Insight and State-of-Knowledge documents, guidance, training materials, webinars, workshops and other dissemination activities.

New Domain Insights

Progress has continued in expanding the [EURAD Roadmap](#) knowledge base. Domain Insights (DI) provide concise and accessible introductions to individual Roadmap domains and are particularly useful for early-career professionals, specialists entering a new field and organisations seeking an overview of established knowledge and key information sources. A new draft is available for DI 4.1.2 – Describe bedrock transport properties (aqueous and gas transport, advection/dispersion, diffusion) including retention (sorption, matrix diffusion) of different geological materials (Author: Norbert Maes). This DI will be published within the next two to three months.

Domain Insight dissemination

Publishing a knowledge document is only one part of effective knowledge transfer. EURAD-2 therefore complements DI publication with dissemination sessions that allow participants to engage directly with authors and subject-matter experts.



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On March 10th, author Nuria Marcos presented her work for Domain Insight 3.4.2. on Co-Disposal. She described the concept of co-disposal - the final disposal of radioactive waste in different areas, and at the same or different depths in a single facility. Her focus was on the interactions of materials used in the EBS in case of co-disposal and on how to confirm that interactions between different EBS materials in disposal areas for different waste types do not compromise the performance of the disposal system.

On May 18th, a webinar presented DI 3.2.2 on LL-ILW Containers. The session covered container concepts and designs, their contribution to operational, storage and long-term disposal safety, examples from different national programmes, and current challenges and innovations. Further dissemination sessions are planned for newly published DIs.

Lunch & Learn

The EURAD-2 Lunch & Learn series has continued to provide an accessible forum for sharing knowledge and experience across organisations and national programmes. On June 18th Urszula Brykała presented the research and development programme of the Polish Radioactive Waste Management Plant, ZUOP. The session provided an overview of Poland's activities related to existing and future disposal facilities, waste retrieval and treatment, engineered barriers, repository development and plans for a Polish Underground Research Laboratory.

The next announced Lunch & Learn session will take place on 30 September 2026 and will introduce the PIANOFORTE Strategic Research and Innovation Agenda.

Call for Domain Insight authors and reviewers

EURAD-2 continues to invite experts from across the partnership to contribute as authors and reviewers of new DI documents. Authors receive templates, guidance and support from the WP2 KM team, while reviewers help ensure that each document provides a technically sound, balanced and accessible introduction to its Roadmap domain.

Contributing to a DI is an opportunity to preserve specialist knowledge, improve its accessibility and support knowledge transfer to the next generation of radioactive waste management professionals. Participants interested in contributing are invited to register their interest through the following form: <https://ec.europa.eu/eusurvey/runner/fe9d8a95-42c3-76c9-f787-1f499bf0ded3>



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Mentoring and Mobility programs

During the summer months, WP2 Task 4 opens once again the Mobility and Mentoring Programmes for applications. The Mentoring Programme is accepting new mentor and mentee applications until **September 30th 2026** via <https://euradschool.eu/eurad-2-mentoring-programme/>

Mobility grants have the deadline last day of EVEN months (such as October and December 2026). <https://euradschool.eu/application-guidelines/>

WP STREAM and L'OPERA

The second annual WP7 L'OPERA workshop took place in Prague (CTU – Czech Technical University) on April 14–15, 2026. About 30 participants attended in person, with an additional 10 joining online. Representatives from 25 organizations contributed and actively discussed the status of advancement and future of their activities related to the long-term evolution of waste forms for the immobilization of LILW.

The event concluded with a technical visit to the RAW processing department at ÚJV Řež and the research reactor at CVŘež. Following the workshop, the main achievements and issues were presented to end users and stakeholders on May 12 during a dedicated online session.



Most of the activities related to the knowledge management focused on the knowledge transfer and the organization of training sessions in collaboration with WP5 ICARUS and WP6 STREAM. The first initiative was the “Course on Geopolymers for Radioactive Waste Conditioning,” held from May 18th to 20th (see specific communication). Training sessions on “Radiolysis” and “Treatment and Conditioning” are currently in preparation.

Most beneficiaries already have samples available for characterization, and additional samples are expected in early 2027 from WP6 STREAM following the optimization of formulations.

Divided into two phases, a common and robust protocol for the characterization of waste forms was established. A first inventory of samples was delivered in January 2026, summarizing fresh-state properties and compressive strength. This inventory will be regularly updated with additional information on microstructure, porosity, and results from leaching tests.

Leaching experiments have already started, and some samples, produced in previous programs such as PREDIS, are still under investigation to assess long-term leaching behavior. The experimental conditions for leaching tests were defined in a common protocol and shared with the Predisposal community, along with key parameters for artificial ageing. These include target doses for samples subjected to gamma irradiation.

Preliminary results from sample characterization and leaching experiments were presented during the annual event and will be further discussed during a technical session later this year.

Although the implementation of results will begin later in the program, activities have already been initiated to identify the requirements for different models to predict the long-term behaviour of waste forms and their physical and chemical evolution.

WP ANCHORS – Annual meeting 3 in Prague (April 2026)

From March 31 to April 2, 2026, the third annual meeting was held in Czech Republic. The event brought together more than 50 partners to discuss the project's progress. Each of the partners presented their ongoing and planned activities.

The meeting also served as a valuable platform to engage ANCHORS end-users, who were invited to exchange on the latest scientific and technical developments.



Following the annual meeting, ANCHORS organised a joint workshop with the OPTI work package, entitled "Optimization: Bridging Science, Strategy and Society". The workshop addressed key challenges related to the optimisation of geological disposal facilities, including backfill design and performance, uncertainties associated with experimental data, implementation strategies, regulatory expectations and societal perspectives. One of the main outcomes was the recognition of the need for a European database gathering information on bentonite mixtures, alternative backfill materials and their characterisation to support optimisation activities. In this context, the ANCHORS Database (ADB) was highlighted as an important initiative that can contribute to this objective by providing structured and harmonised experimental data.

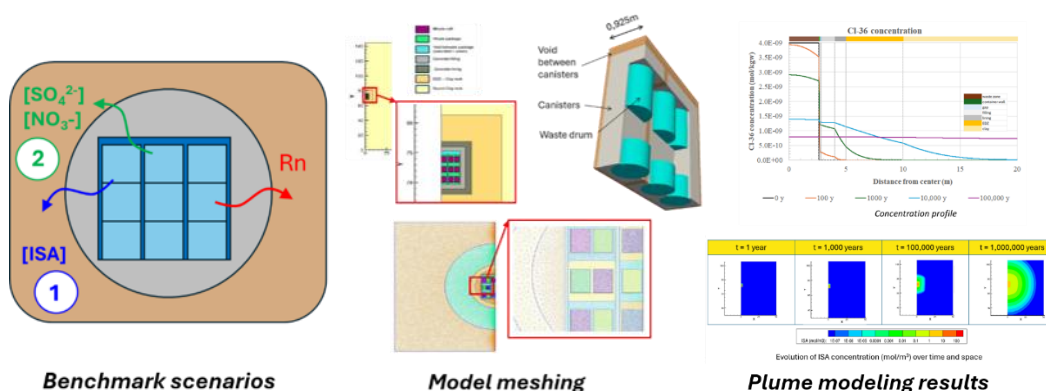


WP RAMPEC

RAMPEC is happy to share recent information regarding progress made in Task 5 (benchmark) and the lab-based experimental work in Task 3, with a focus on the cement systems. Other topics (clay and granite systems, model development) studied in RAMPEC will be addressed in forthcoming Newsletters.

RAMPEC is currently conducting a **benchmark** within the framework of Task 5, aimed at modelling a waste cell containing either **organic or saline waste**, which may affect the behaviour of **radionuclides** both within the waste and in the surrounding clay rock. The primary objective of this benchmark is to evaluate and compare different modelling approaches and model types for representing the impact of such perturbations on radionuclide transport. In particular, reactive transport modelling approaches, with different levels of sophistication, are being assessed against traditional K_d -based sorption models.

The **conception phase of the benchmark**, completed last year, focused on its definition and specification. It included the establishment of the system geometry, as well as the characterization of the host rock, cementitious materials, organic and saline waste, and radionuclides. In recent months, **participating teams have initiated the preliminary modelling phase**, including geometry meshing and model implementation. Initial results were presented during a Task 5 virtual meeting held on June 19th 2026, illustrating the migration behaviour of several radionuclides (HTO, ^{36}Cl , ^{59}Ni , ^{41}Ca , ^{241}Am , and ^{235}U), as well as isosaccharinic acid (ISA), the main degradation product of cellulose.



In the forthcoming **phase of detailed modelling and comparison**, modelling efforts focus on integrating the effects of organic compounds and soluble salts on radionuclide behaviour. A template for a first comparative analysis of preliminary results is established that will be used during the entire benchmark duration.

During the last technical meeting for the Subtask 3.3 dedicated to **experimental studies in the cement systems**, progress in Year 2 was presented for each institution. We shortly introduce two examples: (i) the effect of the presence of nitrate or sulfate on CSH surface charge was

characterised by CIEMAT. The presence of **saline conditions decreases the surface charge of CSH**. This effect is dependent on Ca/Si ratio and it is more pronounced for sulfate. (ii) First results concerning the **stability of ion-exchange resins (IER)** in cementitious conditions (from portlandite buffer to NaOH 2M) and radionuclide (RN) loading/leaching from IER are generated by KIT-INE. Leaching of radionuclides follows the order $\text{Cs(I)} > \text{Ni(II)} > \text{Pu(IV)}$, consistently with inverse order of IER affinity, i.e., $\text{Pu(IV)} > \text{Ni(II)} > \text{Cs(I)}$. Batch sorption experiments to assess the effect of saline perturbation in all investigated systems are ongoing.

Further related to the experimental Task 3, we want to update on the planning of a **"SUDOKU-RAMPEC joint training workshop"** focussed on diffusion / reactive transport experiments. The aim is to enhance exchange and networking between all teams involved in solute diffusion studies in porous media to share experiences and best practices in the field of diffusion / reactive transport. A survey will be sent to the EURAD-2 community to identify key interests to be addressed during the training workshop. A first meeting is planned for the 13th of October 2026 to evaluate the survey and define the preliminary program of the training workshop. The training workshop is planned for January 2027 as an in-person event with a maximum of 50 participants. Details on the location and registration will be announced in October 2026.

WP SUDOKU – Latest news and highlights

The initial phase of SUDOKU implementation has focused on establishing laboratory-scale experiments and in-situ monitoring to investigate cover effectiveness and the chemo-mechanical degradation of cementitious barriers, as well as their subsequent impact on radionuclide migration.

The SUDOKU SOTA report (D14.1)—a comprehensive summary of the main designs and safety concepts for near-surface repositories across partner countries, and the processes governing the performance of their engineered barriers—was delivered in November 2025.

From March 3–5, 2026, the SUDOKU team gathered in Troyes, France, for its 2nd WP meeting, kindly hosted by ANDRA. It was a fantastic opportunity to take stock of the WP partners' achievements so far, address the current challenges they face, and ensure everyone is aligned for the next steps. A major highlight of the event was a technical visit to ANDRA's VLLW and LILW-SL disposal facilities, where participants also got a first-hand look at their full-scale multilayer cover mock-up.

On June 12, 2026, the Task 3 progress meeting was held online, facilitating further discussions on specific challenges related to experimental work on multilayer covers as well as the development and application of monitoring devices. Additionally, the meeting addressed the content of the task deliverable, the timeline for preparing its first draft, and potential optimization recommendations based on the planned Task 3 experiments and exchanges.

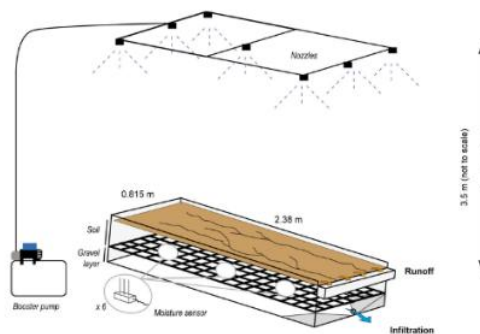
PhD Research Spotlight

Within the ongoing SUDOKU R&D programme, several PhD students are currently focusing their research on laboratory-scale tests to study multilayer cover and cementitious barrier performance, as well as on modelling radionuclide migration from radioactive waste repositories.

- **Gabriel Portzer** (Mines Paris)

Gabriel's research is focused on hydric erosion under simulated intense rainfall applied to the cover of the Manche disposal facility (CSM), the first radioactive waste repository ever operated and closed in France.

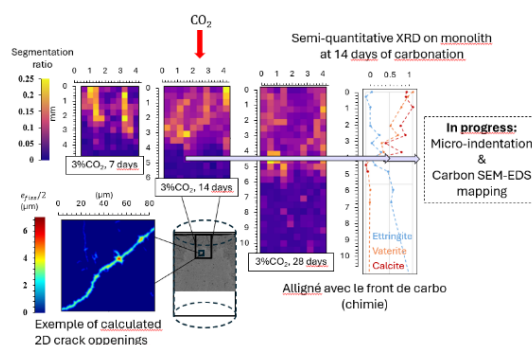
Gabriel is expected to defend his thesis at the end of 2026.



- **Adrien Parpaillon (ASNR)**

Adrien's research focuses on the chemo-mechanical evolution of corrosion within degraded cement matrices, specifically studying the coupled processes of atmospheric carbonation and reinforcement corrosion. Within the SUDOKU working group, Adrien uses a multi-technical approach to understand degradation phenomena in reinforced low-pH cementitious materials to inform numerical modeling approaches.

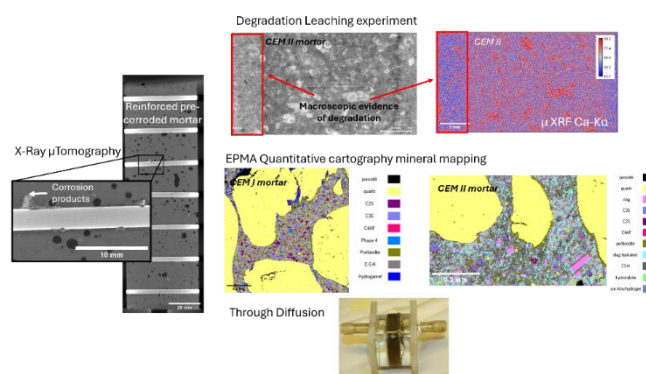
Adrien is expected to defend his thesis in Autumn 2027



- **Lia Craske (BRGM)**

Lia's research focuses on studying the impact of the degradation of reinforced cementitious materials on the diffusion of radionuclides. She uses numerous physicochemical techniques to characterize samples before and after diffusion experiments, coupling them with modelling approaches.

Lia is currently at the end of her first year of PhD studies.



WP DITOCO2030 – White paper reaches a key milestone towards publication

The DITOCO White Paper on Digital Twins for radioactive waste management has reached an important milestone towards publication. Following several iterations and valuable inputs from some of Europe's most advanced institutions in this field, the document has now gone through the final pre-publication formalities. This process has helped refine the structure, strengthen the key messages and present the White Paper as a clear, accessible and high-impact document for the EURAD-2 community.

The White Paper consolidates a shared perspective on how Digital Twins could support the future management of nuclear facilities dedicated to the processing, treatment, storage and repositories of radioactive waste

Rather than presenting Digital Twins as an immediate off-the-shelf solution, the document sets out a realistic and progressive roadmap for the sector. It highlights the need to move from fragmented digital practices towards more integrated, interoperable and traceable digital environments.

In particular, the White Paper identifies Digital Twins as a strategic opportunity to improve continuity between design, construction, operation, monitoring and long-term safety-related knowledge. Building on practical use cases and lessons learnt from applied initiatives, it provides a solid basis for future discussion on how Digital Twins can be progressively implemented in the radioactive waste management sector.

This milestone has been made possible thanks to the hard work, commitment and valuable contributions of the DITOCO task members, the Work Package team and the wider Work Package community, under the guidance of the Work Package team leader. Special thanks are also extended to the external reviewer and the Knowledge Management team for their support in shaping the document into a clear and robust product ready for publication.

With this milestone achieved, the DITOCO White Paper will soon be made available to the EURAD-2 community. Its publication aims to provide a common basis for future discussion, experimentation and coordinated action on the implementation of Digital Twins in radioactive waste management

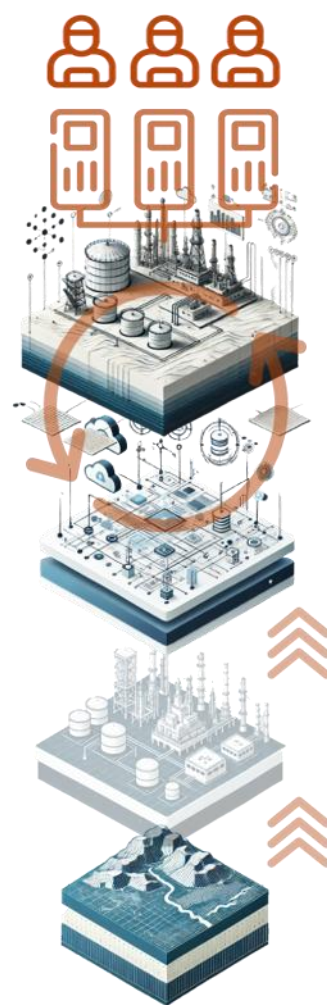


Figure 1 Multi-layer digital twin.
Credit to INGECD

WP DITUSC - Advancing Thermodynamic Understanding for Safety Cases

The EURAD-2 Strategic Study DITUSC (Development and Improvement of Thermodynamic Understanding for use in Radioactive Waste Disposal Safety Case) has reached a major milestone with the release of its White Paper and the successful organisation of its final workshop in Bruges.

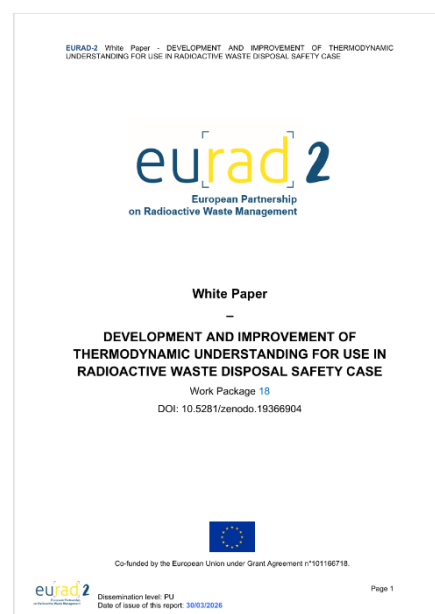
Release of the DITUSC White Paper

The DITUSC White Paper (Deliverable D18.3) provides a consolidated, community-driven perspective on the role of thermodynamics in supporting radioactive waste disposal Safety Cases.

It reflects the outcome of extensive knowledge capture and exchange activities across Waste Management Organisations, Technical Safety Organisations, Research Entities, and end-users, with a focus on identifying and prioritising key thermodynamic challenges and data gaps.

The document sets out a shared vision and translates identified needs into strategic recommendations and proposed actions, with the aim of improving the consistency, usability, and impact of thermodynamic knowledge in safety assessments.

The White Paper is now publicly available on the [EURAD website](#)



Final DITUSC Workshop – Bruges, 11–12 May 2026

The DITUSC final workshop, coupled to the WP closure meeting, was successfully held in Bruges on 11–12 May 2026.

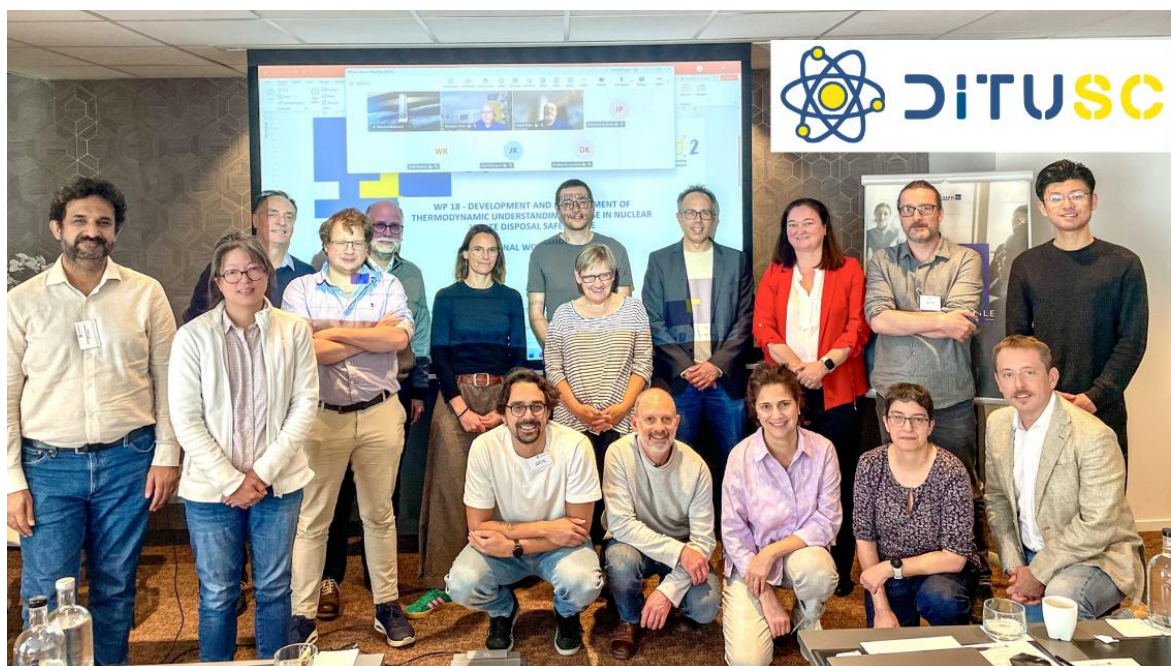
The workshop brought together experts and end users from across the EURAD community to review the main findings of the Green and White Papers and to discuss their implications for future research and safety case development. It confirmed the central role of thermodynamics as a cornerstone of radioactive waste disposal Safety Cases.

Across the two days, discussions were structured around key thematic areas reflecting the main scientific challenges addressed in DITUSC, including redox processes, kinetics, interactions between radionuclides and organic matter, cement systems, solid solutions, complexation in multi-ligand systems, high salinity environments, temperature effects, and thermodynamic database methodologies.

Key outcomes of the workshop include:

- Confirmation that current thermodynamic approaches provide a robust basis for safety assessments, although often relying on conservative assumptions due to remaining uncertainties.

- Recognition that no critical gaps invalidate existing Safety Cases, while important uncertainties persist in several domains relevant for long-term performance assessment.
- Strong consensus on the need for enhanced coordination, harmonised methodologies, and targeted R&D efforts to improve predictive capability and reduce conservatism.



The Bruges workshop highlighted that the main challenge is not only the generation of new thermodynamic data, but also the ability to better integrate complex and coupled processes—particularly where equilibrium approaches reach their limits—and to ensure that knowledge is effectively structured and transferable for Safety Case applications.

Overall, the event marked a transition from the identification of knowledge gaps towards the implementation of coordinated European actions.



PHD CORNER



Leonard Grabow / TU-Dresden Helmholtz Centre for Environmental Research
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Supervisor: Prof. Olaf Kolditz and Dr. Philipp Selzer

PhD thesis: Accelerating reactive transport simulations using methods of machine learning

Can you explain the scope of your thesis / master and the link with the work package you are involved in?

The goal of my thesis is to accelerate numerical models that solve the transport and chemical reactions of chemical species in the subsurface. I do this with the help of artificial intelligence and machine learning (AI/ML) methods by replacing parts of the numerical model, specifically the chemical reaction part, with so-called surrogates. These surrogates learn the mapping between input and output data and thereby circumvent the otherwise computationally heavy calculations. The main application of this accelerated model will be to model the transport of radionuclides in the host rock of a repository. With this, my work is directly embedded in the HERMES WP in which high-fidelity numerical models of strongly coupled processes are developed by using physics-based and AI/ML approaches.

What do you wish other people knew about your work scope? Are there any common misconceptions about your research area?

Solving these strongly coupled processes numerically is a very useful way to further understand the interactions in complex natural systems. By accelerating parts of these numerical models with AI/ML methods, we broaden its applicability and finally our system understanding. It is important to keep in mind, however, that AI/ML methods just reframe the problem of complexity. They may not completely replace numerical models but they can significantly help us to get to the right answers faster, if applied correctly.

How do you think your field will evolve in the next 5-10 years?

At least for me, it is extremely hard to predict how AI/ML will evolve in the application to numerical models. Big tech companies are focusing more and more on evaluating mathematical problems, because mathematical problems offer verifiable ground truth, making them attractive benchmarks. With this, I expect some greater developments in a few years. However, it is for sure that the community of reactive transport modelling will have many possibilities in the future to follow up on these, leaving room for a lot of interesting work.

What are your biggest expectation for your PhD journey?

The biggest expectation would be to be able to compare different AI/ML methods with each other and to come up with a more consistent and overarching view on how to approach the construction of surrogates for reactive transport modelling. Though the biggest expectation is not strictly the most realistic one.

What is your first impression of EURAD-2 ?

EURAD-2 slowly starts to reveal for me as an extremely wide and rich network and it is still challenging for me to overview all the different research foci and partners. On the smaller scale of the WP of HERMES, I feel really welcomed and connected. Here I enjoy the lively discussion among the people and learn a lot.

If you could collaborate with any scientist, past or present, who would it be?

It would be Jacob Bear.

**Upcoming events****SEPTEMBER**

08-10: [EURAD-2 Annual event n°2](#)

21-25: [DigiDECOM 2026](#)

29: [InCoManD webinar: Peridynamic models for corrosion damage and fracture](#)

30: L&L – PIANOFORTE SRA

NOVEMBER

03: EURAD-2 end-user pitching webinar
– *registration opening soon*

OCTOBER

01: [Training workshop on experimental databases and data management](#)

13: EURAD-2 Second wave WPs pitching webinar – *registration opening soon*

15: [L&L – Navigating Open Access Publishing](#)



Now published

WP3 ASTRA Alternative radioactive waste management strategies outcomes / impacts to Member States: [Link](#)

WP3 ASTRA Workshop on alternative RWM strategies for long-term storage exceeding the design lifetime: [Link](#)

WP4 FORSAFF Towards Safe and Sustainable Deployment of LW-SMRs and AMRs: Identifying Knowledge Gaps in Waste Management: [Link](#)

WP4 FORSAFF Outcomes/Impacts report to Member States and End Users: [Link](#)

WP5 ICARUS Selection of specific use cases to test the developed NDT and methods in relevant industrial conditions: [Link](#)

WP11 CLIMATE Synthesis report on climate change impacts on radioactive waste management facilities: [Link](#)

WP11 CLIMATE Online basic training course on climate change fundamentals and modelling, impact on radioactive waste facilities and climate risk assessment: [Link](#)

WP11 CLIMATE Outcomes to Member States and End Users: [Link](#)

WP12 RAMPEC Initial State-of-the-Art: [Link](#)

WP13 OPTI Technical Key Challenges for Optimisation of Geological Disposal Facilities for High-level Waste: [Link](#)

WP18 DITUSC White paper – Development and improvement of thermodynamic understanding for use in radioactive waste disposal safety case: [Link](#)



We are out there



Álvaro Romero-Salido • 1er
Físico | Investigador PhD en CIEMAT Physicist | PhD researcher at CIEMAT
2 sem. •

I'm excited to share my first first-author publication in Applied Geochemistry (Elsevier)!

This paper represents an important milestone in my PhD research, and I'm very happy to see it finally published after months of experiments, data analysis, writing, and revisions.

Diffusive behaviour of HTO, $^{36}\text{Cl}^-$, $^{35}\text{SO}_4^{2-}$ and $^{75}\text{SeO}_3^{2-}$ through compacted FEBEX bentonite: Temperature-dependent transport

In this work, we investigate how temperature and dry density influence the diffusion of radionuclides through compacted FEBEX bentonite, one of the reference materials considered for engineered barriers in deep geological repositories (DGRs).

The diffusion coefficients obtained as a function of temperature provide essential experimental data for developing more realistic radionuclide transport models, contributing to the long-term safety assessment of radioactive waste repositories.

This research was carried out at CIEMAT, in the *Fisicoquímica de Actinidos y Productos de Fisión (FAPF CIEMAT)*, within the framework of the EURAD-2 project.

I would like to sincerely thank my supervisors, co-authors and colleagues for their guidance, support and collaboration throughout this work.

Looking forward to continuing my PhD research! 🚀

Check out the full paper here: <https://lnkd.in/eDCfQAAq>

#AppliedGeochemistry #RadioactiveWaste #DeepGeologicalRepository
#NuclearWaste #Bentonite #Diffusion #PhD #Research #CIEMAT #EURAD2

Správa úložišť radioaktivních odpadů
793 abonnés
3 mois •

V SÚRAO jsme přivítali Young Generation skupinu projektu EURAD-2.eu

Ve čtvrtek 16. dubna navštívilo PVP Bukov celkem 9 mladých odborníků z ... plus

Afficher la traduction



Natalia Jakus • 1er
Environmental Scientist | Geomicrobiologist | Researcher at EPFL
1 mois •

'Extremophiles expand the limits of life and provide important insights for biotechnology, astrobiology, and the long-term safety assessment of Deep Geological Repositories (DGRs).'

We heard several fascinating examples today during the #InCoManD EURAD-2 webinar by **Mohamed Merroun**, who discussed how microorganisms may adapt to future (extreme) DGR conditions. One of these challenges is temperature, with canister surface temperatures, in some scenarios, expected to reach up to 140°C.

At the opposite end of the spectrum are cold-adapted microorganisms. The photo shows a bloom of snow algae responsible for what is often called watermelon snow. These microorganisms thrive in melting snow and ice, colouring the surface pink with protective pigments.

In Switzerland, watermelon snow can often be observed well into summer at elevations above 2,000 m. This particular patch was photographed in mid-June along the spectacular (!) trail towards Faulhorn in the Interlaken region 🇨🇭.

From engineered subsurface environments to alpine ecosystems, microorganisms show a remarkable range of adaptations!

The webinar recording on extreme microbes in DGRs is in the comments below.

Afficher la traduction

