AIR²
Access to INFRASTRUCTURES for Radiation protection Research

Editorial

When we conceived CONCERT, we estimated that by publishing 40 issues of AIR^2 with the presentation of 3 infrastructures per bulletin, we would have largely covered the resources made available to the scientific community. Five years later, we noted that these infrastructures are numerous, that they largely cover the fields of activity necessary for research in radiation protection, but that they are often little known beyond the regular users. It is essential to make them known and collectively mobilize to ensure the long-term maintenance of these essential infrastructures. In order to publish AIR^2 and its 3 infrastructures on a monthly basis, we contacted several infrastructures. This Special Issue gathers 5 infrastructures that reached to us after the publication of the 40 issues that we had initially agreed upon.
Other infrastructures would have deserved to be highlighted, but the project ends on May 31st. Let's hope that another EJP such as CONCERT will take over and continue this work.

Dr Laure Sabatier, CEA

The floor to...

Over the past 30 years, the Internet has grown from being nearly non-existent into the biggest, most accessible and visited information database ever created. As such, it has revolutionized the way people communicate, socialize, search for information and think about knowledge and learning. This is all the more applicable in the case of young scientists. As a digital generation, they expect digital learning tools to be integrated into their education and tend to embrace social learning environments.

In the frame of the CONCERT WP6 subtasks *6.2.4 Harmonization and exercises* and *6.3.2 Developing training*, the CEA conducted a feasibility exercise aiming to develop online tutorials for the main cytogenetics techniques used in biodosimetry to address the ever-growing demand for modern learning tools.

To begin with this tentative, research was carried out to evaluate whether online sources and material covering topics of interest to the Radiation Protection Research community exist and to which extend. An analysis of the most popular MOOC platforms such as edX, Coursera and Udacity revealed that there are currently no courses available on cytogenetics and biodosimetry, while courses covering other topics relevant to Radiation Protection Research are scarce. By far, the most important source of online educational material was Youtube and the Video journal Jove. Nevertheless, the few videos describing how to perform the main biodosimetry techniques were of low image and/or sound quality and failed to provide the viewer with sufficient information and details.

To address this issue, 5 video tutorials describing step by step the most widely used biodosimetry techniques were designed and uploaded on Youtube. The videos focus on:

1) The Dicentric Chromosome Assay
2) The Cytokinesis Block Micronucleus Assay
3) The Premature Chromosome Condensation Assay
4) The Telomere and Centromere FISH staining
5) The multi FISH staining

The duration of each video is 20-25 minutes and their structure comprises an introduction explaining the context and goal of the technique, the list of materials and solutions required for performing each assay, a detailed presentation of the experimental steps and a Q&A session.

This initiative was presented during the ERPW 2019 with an oral presentation (C. Herate) in the session Education & Training. Since then, the videos have been uploaded and hosted on the Youtube Channel "CEA Sciences" (~16K subscribers) aiming to reach out to the maximum number of people. Feel free to share!

This type of MOOC series can be extended to many techniques in future projects. Indeed, beyond the new educational practices favoured by the younger generations, the need for greater distance between individuals should profoundly change our habits and make online teaching indispensable.

Photo: CEA

The cytogenetics tutorial team: Cecile Herate, Maria Panagiotopoulou, Patricia Brochard, Michelle Ricoul, Laure Sabatier

Special Issue 10

April 2020

CONCERT CORNER

Future events:

28 Sept.-2 Oct. 2020
ERPW 2020, Estoril, Portugal
Extended deadline for abstract submission: 30 April

WP 6 News:

AIR²D²:
- Please complete the online form(s) to register your infrastructure(s) in the database.

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Contents:

EUROPEAN JOINT PROGRAMME FOR THE INTEGRATION OF RADIATION PROTECTION RESEARCH CONCERT
HORIZON 2020
This project has received funding from the Euratom research and training programme 2014-2018 under grant agreement No 662287

CIEMAT External Dosimetry Service and Retrospective Luminescence Dosimetry Lab

The CIEMAT External Dosimetry Service (EDS) has provided dosimetry to Spanish customers since 1959. The CIEMAT EDS is currently approved by the Nuclear Safety Council (CSN), the Spanish regulatory body, and accredited according to the ISO-17205 standard by the Spanish National Accreditation Body (ENAC) for the determination of the personal dose equivalents $H_p(10)$ and $H_p(0{,}07)$ and the ambient dose equivalent $H^*(10)$.

For personal dosimetry, the thermoluminescent dosimetry system is based on a combination of two $Li_2B_4O_7$ and two $CaSO_4$ detectors, with different filters, for whole body dosimetry and on one $Li_2B_4O_7$ detector inside a ring hanger for extremity dosimetry. Dosimeters are read in two automatic readers with optical heating. Calibration is performed in a reference metrology laboratory in terms of the operational quantities and a ^{137}Cs panoramic irradiator is routinely used for periodic internal verification. The CIEMAT EDS manages approximately 1,000 whole-body and 100 extremity dosimeters a month.

For environmental and area monitoring, the dosimetry system is based on a combination of six LiF:Mg,Ti and four LiF:Mg,Cu,P thermoluminescent detectors, enclosed inside a holder designed and manufactured by CIEMAT. Dosimeters are read in two automatic readers that use hot nitrogen as a heating method. Two programmable ovens are used for annealing and pre-readout thermal treatment of the dosimeters. As for personal dosimeters, calibration is performed in a reference metrology laboratory. A ^{90}Sr beta irradiator is used for periodic routine verification. The CIEMAT EDS monitors approximately 100 environmental stations and 50 workplaces.

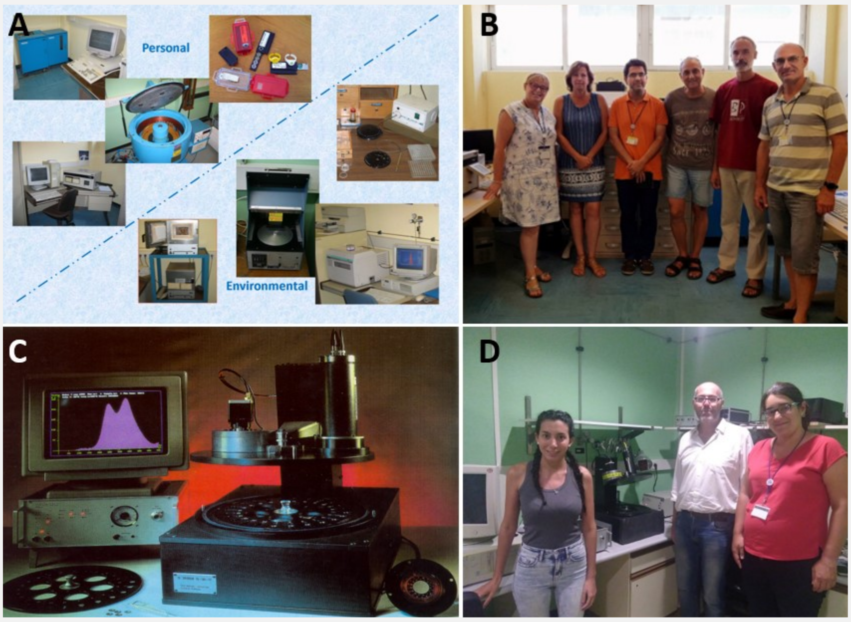
The CIEMAT EDS regularly participates in national and international intercomparison exercises for whole body, extremity, and environmental dosimeters, mainly organized by the CSN and the European Radiation Dosimetry Group (EURADOS). The results confirm the competence of the laboratory to produce valid results.

The CIEMAT EDS team is involved in two EURADOS Working Groups: Harmonization of Individual Monitoring and Environmental Dosimetry. These activities contribute to increasing quality and reliability in the protection of workers and the public against ionizing radiation.

Ana Romero & Virgilio Correcher

The research activities of the laboratory are focused on the numerical analysis and simulation of thermoluminescence glow curves for improving dose assessment, the study and development of single-exposure neutron spectrometers for applications in workplace monitoring, and the implementation of a neutron-dosimetry system based on track detectors for personal monitoring.

The CIEMAT has a Retrospective Dosimetry Laboratory for the preparation of ceramic materials and later dosimetric evaluation by luminescent methods. Preparation includes mechanical, chemical, and thermal treatment to separate the components from the matrix or mineral phases with dosimetric properties. Evaluation stages apply thermoluminescence (TL) or optically-stimulated luminescent (OSL) techniques for situations in which there is no conventional dosimetry measurement system available (emergencies in radiological accidents), the detection of irradiated food, dating, spatial dosimetry, etc. The CIEMAT has access to experimental techniques for structural characterization of mineral phases under study in cooperation with the CSIC Museum of Natural Sciences.



A) CIEMAT EDS equipment for TL dosimetry B) CIEMAT EDS personnel: A. Romero, M. García, J.F. Benavente, J.L. López, A. González, R. Rodriguez. Not present: M. García, A. Hernanz, R. Martín C) TL/OSL reader D) CIEMAT Retrospective dosimetry laboratory personnel: A. Zabala, V. Correcher, I. Sarasola

Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas

ID Card:

Platform type:
External Dosimetry Service
External dosimetry: personal and environmental

Retrospective Luminescence Dosimetry Lab
Retrospective Dosimetry

Main techniques proposed:
External Dosimetry Service
Thermoluminescence dosimeters: $Li_2B_4O_7$:Cu; $CaSO_4$:Tm; LiF:Mg,Cu,F; LiF:Mg,Ti

Retrospective Luminescence Dosimetry Lab
Thermoluminescence

Users:
External Dosimetry Service
~ 1,000 exposed workers using whole body dosimeters (monthly monitoring)
~ 200 exposed workers using extremity dosimeters (monthly monitoring)
~ 100 stations with environmental dosimeters (three-month period)
~ 50 points with area monitoring (one-month period)

Retrospective Luminescence Dosimetry Lab
Researchers

Address:
CIEMAT, External Dosimetry. Avda. Complutense 40, E34, P2-03
28040 – Madrid, Spain

Access:
The facility is open to joint research collaborations

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Retrospective Luminescence Dosimetry Lab
Virgilio Correcher
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Related to:
EURADOS

Ciemat EDS: ISO/IEC 17025 accreditation and 3 y of operational experience as an accredited laboratory, Romero A. M., Rodríguez R., López J. L., Martín R., Benavente J. F. (2016), Radiat Prot Dosim, 170 (1–4), 70–73
UV effect on the cathodo- and thermoluminescence properties of a gem-quality Cr-rich diaspore (α-AlOOH), Topaksu M., Correcher V., Boronat C., Garcia-Guinea J., Portakal Z. G., Akça S. (2018), Appl Radiat Isotopes, 141, 101-106

AIFIRA Microbeam

Study of radiation-induced response by targeted irradiation

The AIFIRA facility (Applications Interdisciplinaires des Faisceaux d'Ions en Région Aquitaine) is a small scale ion beam facility equipped with a single stage electrostatic accelerator delivering bright beams of light ions (H^+, D^+, He^+) in the MeV energy range. The facility, run by CENBG (Centre d'Etudes Nucléaires de Bordeaux-Gradignan, a laboratory of the University of Bordeaux and CNRS/IN2P3), provides ion beam irradiation, analysis and imaging techniques to academic research groups and companies.

Photo: H. Seznec/CENBG

Dr. Philippe Barberet

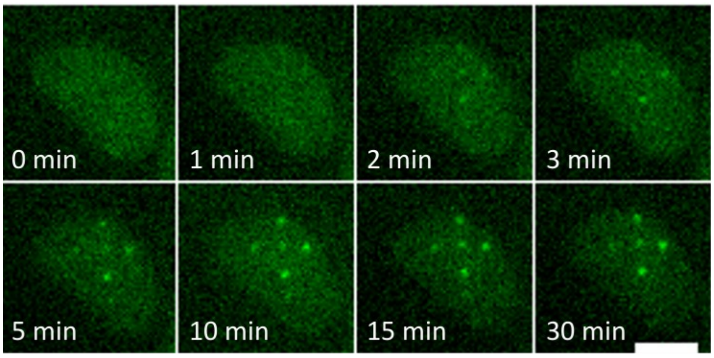

Photo: P. Barberet/University of Bordeaux

Online time-lapse microscopy of the RNF8-GFP protein (DNA double-strand breaks) in a nucleus irradiated with 5 single α-particles on the microbeam line. The irradiation takes place at t=0 and 5 α-particles are delivered on a cross pattern. Scale: 10 µm (source Muggiolu et al. 2017).

AIFIRA is open to external users and equipped with a microbeam line dedicated to targeted irradiation of living cells at the micrometer scale. This beamline was developed by the local research team ("Ionizing Radiation and Biology", iRiBio group) and the technical staff of CENBG. It is operational since 2013 and constantly upgraded. Irradiation of sub-cellular structures (nucleus/cytoplasm) can be conducted with protons (12 keV/µm) or helium ions (140 keV/µm) with an accuracy of about 2 µm. The early radiation-induced response can be measured online by following GFP- or RFP-tagged proteins using fluorescence time-lapse imaging. In the last years, technical upgrades have been conducted such as the installation of FRAP (Fluorescence Recovery After Photobleaching) capabilities on the fluorescence microscope.

More recently, thin diamond detectors, developed in collaboration with CEA-LIST, have been inserted upstream the sample enabling a precise detection of every single delivered particle while preserving the microbeam lateral resolution. The combination of all these features allowed for example to measure the accumulation of DNA double strand break proteins in single alpha-particle tracks in the first minutes after irradiation (Muggiolu et al. 2017). The irradiation protocols were also recently extended to perform targeted irradiation of specific cells or organs in the *C. elegans* nematode (Torfeh et al. 2019).

A L2 laboratory for cell culture and microbiological preparations was also developed by the local research team (iRiBio group) in close proximity to the microbeam facility. Access to the microbeam and the laboratory can be considered in the frame of collaborations with the iRiBio group at CENBG.

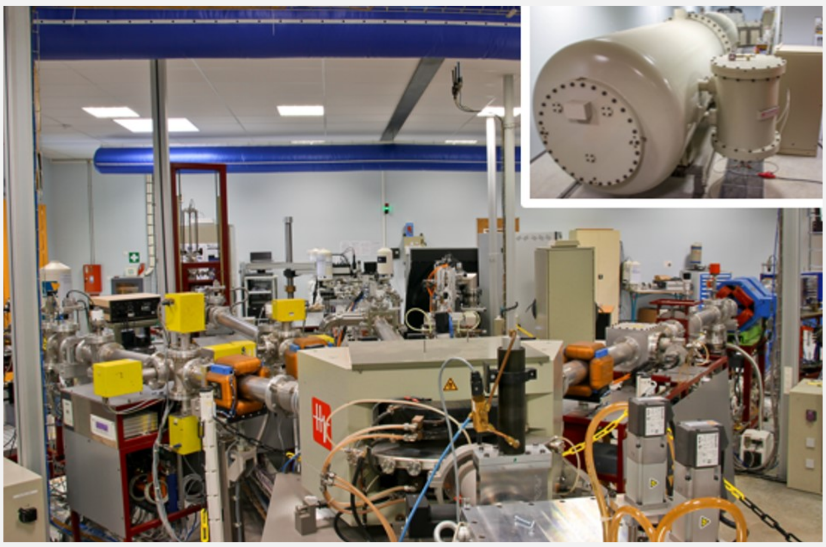

Photo: P. Barberet/University of Bordeaux

The AIFIRA facility and its 5 beamlines

ID Card:

Exposure type:
External

Source:
Single-ended 3.5 MV electrostatic accelerator (Singletron™, HVEE)

Dose rate:
Single ion irradiation

Irradiation type:
Proton and alpha-particles, up to 3 MeV. Horizontal beam.

Irradiated organism type:
Cells and *C. elegans*

Address:
19 chemin du solarium CS10120
33175 GRADIGNAN Cedex
FRANCE

Access:
Joint research collaborations

Supporting lab:
Cell culture lab, instrumentation lab

Internet link:
http://www.cenbg.in2p3.fr/-Plateforme-AIFIRA

Contact:
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Dr. Hervé Seznec
seznech@cenbg.in2p3.fr

+33 5 57 12 09 03

Related to:
MELODI

Single α-particle irradiation permits real-time visualization of RNF8 accumulation at DNA damaged sites, Muggiolu G., Pomorski M., Claverie G., Berthet G., Mer-Calfati C., Saada S., Devès G., Simon M., Seznec H., Barberet P. (2017), Sci Rep, 7, 41764
Monte-Carlo dosimetry and real-time imaging of targeted irradiation consequences in 2-cell stage *Caenorhabditis elegans* embryo, Torfeh E., Simon M., Muggiolu G., Devès G., Vianna F., Bourret S., Incerti S., Barberet P., Seznec H. (2019), Sci Rep, 9, 10568

The Calliope Facility

^{60}Co gamma irradiation facility at ENEA Casaccia Research Centre

The Calliope facility at the ENEA-Casaccia Research Centre in Rome, Italy, was built in 1967-1968. Since the '80s the facility has been involved in radiation processing research on materials and devices to be used in hostile radiation environments such as nuclear plants, Space and High Energy Physics experiments.

The plant is a pool-type irradiation facility with a ^{60}Co (energy= 1.25 MeV) radioisotopic source in a high volume (7.0 x 6.0 x 3.9 m^3) shielded cell. The maximum licensed activity is 3.7 x 10^{15} Bq (100 kCi) and the current facility activity is 2.2 x 10^{15} Bq (December 2019) with a maximum dose rate of 9.6 kGy/h (December 2019).

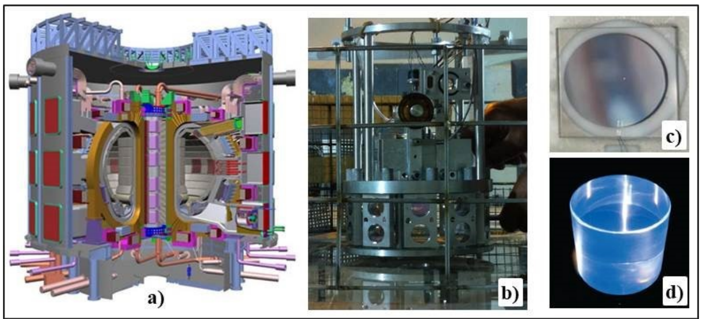

Photo: ENEA - FSN

a) ITER scheme; b) irradiation set-up of optical filters and customized piezoelectric motor for the In-Vessel Viewing System (IVVS); c) single-crystal diamond and d) plastic scintillator for the ITER Radial Neutron Camera (RNC).

The facility has dedicated set-ups, diagnostic and monitoring systems. The irradiation tests can be performed in special environmental atmosphere (such as vacuum, gas mixtures other than air) or at different temperatures and with remote monitoring and acquisition.

A dosimetric laboratory is available at the Calliope facility. Depending on the absorbed dose range of interest, several dosimetric systems are used: Fricke solution (20 – 200 Gy), Red Perspex (5 – 50 kGy) and radiochromic (1 kGy – 3 MGy), alanine-ESR (1 Gy – 500 kGy), Thermo Luminescent Dosimetry TLD (0.1 mGy – 100 Gy) and RADFET (0.01 – 1000 Gy) dosimeters. Among them, the relative solid-state and electronic dosimeters (Red Perspex, radiochromic, alanine-ESR, TLD and RADFET) are periodically calibrated with the Fricke absolute dosimeter. The relative dosimetric systems are used to determine the dose rate value when the Fricke solution is not applicable.

For each test, specific irradiation and dosimetric certifications are issued to the customers.

A. Cemmi I. Di Sarcina G. Ferrara

The Calliope is deeply involved in qualification and research activities, in the framework of international projects and collaborations with industries and research institutions (CMS ECAL at LHC CERN, Belle II at SuperKEKB, SPARK Project H2020, IAEA, ITER, F4E, EUROFUSION). Qualification tests, in compliance with the international standard specifications (such as ESA/SCC 22900, Issue 5 and MIL-STD-883), are mainly performed on components, devices and systems for applications in hostile environments, such as nuclear plants and aerospace, and on concrete matrices for nuclear waste disposal and storage.

The Calliope irradiation plant is the Italian gamma facility recommended by the European Space Agency (ESA) for the Space qualification tests in the framework of the ASIF Programme (Italian Space Agency Supported Irradiation Facility).

Research activities are focused on the investigation of gamma irradiation induced effects on chemical and physical properties of different materials, such as radiation detectors, scintillating crystals, glasses and polymers, for applications in nuclear plants, aerospace and High Energy Physics experiments. Material characterization and biological research are also carried out on conservation and preservation of cultural heritage artifacts, agriculture, AgroSpace and environmental field.

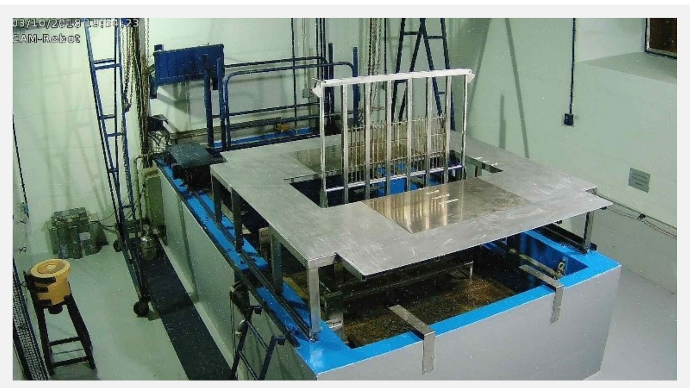

Photo: ENEA - FSN

Irradiation cell with ^{60}Co sources rack and the platform for sample positioning (photo acquired during an irradiation test by local remote camera acquisition).

ID Card:

Exposure type:
External

Source:
Gamma source (energy ~1.25 MeV)

Dose rate:
0 – 9.6 kGy/h

Irradiation type:
^{60}Co radioisotopic source

Irradiated organism type:
Inorganic materials, components and devices, biological matrices

Address:
Calliope Facility
ENEA, Casaccia Research Center
Via Anguillarese 301 – 00123
Rome, Italy

Access:
Fee-based for services;
free for scientific collaborations/projects

Supporting lab:
Dosimetric laboratory; optical (UV-VIS-IR), spectroscopic (ESR) and fluorescence characterizations; climatic chamber for ageing tests

Internet link:
www.enea.it/en

Contact:
Alessia Cemmi
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Related to:
EURADOS

Gamma irradiation Calliope facility at ENEA-Casaccia Research Centre (Rome, Italy), Baccaro S., Cemmi A., Di Sarcina I., Ferrara G., ENEA Report ENEA-RT-2019-04, ISSN 0393-3016
Rad-hard properties of the optical glass adopted for the PLATO space telescope refractive components, Corso A. J., Tessarolo E., Baccaro S., Cemmi A., Di Sarcina I., Magrin D., Borsa F., Ragazzoni R., Viotto V., Novi A., Burresi M., Pellowski F., Salatti M. et al. (2018), Opt Express, 26 (26), 33841-33855

ZATU (Zone Atelier Territoire Uranifère)

A place for interdisciplinary research on (TE)-NOR

Member of European and International Long Term Ecological Research Infrastructures, the French national network of Zones Ateliers (RZA) labelled by CNRS develops a specific scientific approach based on observations and experiments on workshops sites, to conduct multidisciplinary research in the long term. It enables to survey the complex relationships between human activities and the functioning of ecosystems to be studied. The RZA is recognized by ALLENVI, as a Long-Term Experimentation and Observation System for Research in Environment: the SOERE RZA. The RZA is also a member of eLTER Europe and of iLTER for the international.

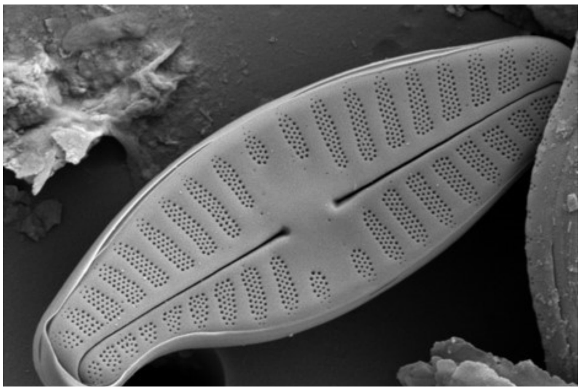

Photo: ERIN, LIST

SEM observations of teratological valves for a diatom species, *Planothidium frequentissimum*, living in radioactive spring water.

Labelled in January 2015, the Zone Atelier Territoires Uranifères (ZATU) focuses on the environments characterized by chronic radiation of natural or enhanced natural origin. A contaminated wetland downstream of a mine tailings repository located in a small watershed and the presence of natural radioactive mineral sources nearby provide an ideal setting to conduct long-term radioecological research in NOR and TE-NOR contaminated sites.

The multidisciplinary fundamental research program builds upon multiple expertise (radiochemists, physicists, geochemists, biologists, ecologists, and researchers in human and social sciences) supported by long-term observation through site instrumentation (radon detectors, piezometers, ...). Focused on adaptation and evolution of life in the presence of enhanced natural radioactivity, on transport and transfer of radionuclides in food webs, and the perception of the associated risk, the research program has for main aim to integrate the data into a Socio-Ecological System (SES) model to help decision makers and stakeholders for the territorial management.

Photo: Personal archive

Gilles Montavon

Researchers aim at opening the following locks:

- How to achieve "multi-scale" approaches, from the past to the future *via* the present, from the sample studied in the laboratory to the watershed of a mining site, from the molecule to the ecosystem scale?
- How can mechanistic approaches be integrated/taken into account in impact assessment codes?
- What are the effects of radioactivity on adaptive or evolutionary processes in living organisms (recent vs chronic long-term exposure)?
- How can the effect of radioactivity on living organisms be distinguished from other confounding factors and how can the effects of radiation be dissociated from chemical effects?
- What are the socio-cultural dimensions of risk?

Recently renewed for 2020-2024, the ZATU involves 22 laboratories from various research organizations (CNRS, CEA, IRSN, BRGM) and French universities. Among the priority actions of ZATU, comparing the methods/results with similar approaches applied to other contaminated sites could help assess whether the risks of low doses to the environment can be effectively addressed. The ZATU is also open to collaborators from the ALLIANCE platform.

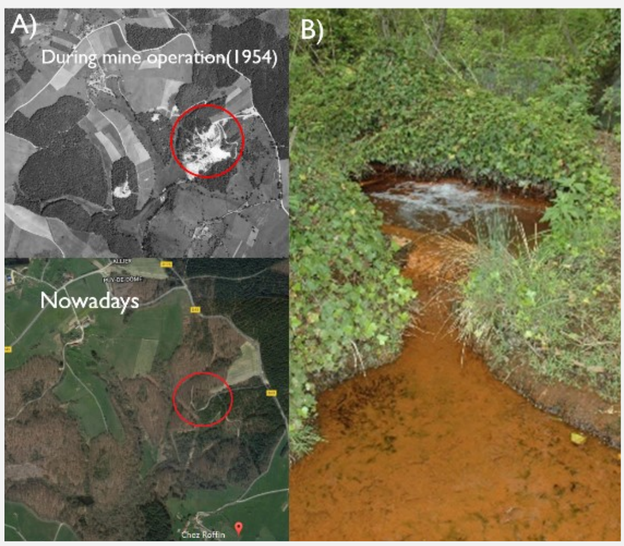

Photo: IGN and Google maps for (A), GEOLAB (UMR CNRS 6042) for (B)

Study of TE-NOR on the 'Atelier site' (Old uranium mine of Rophin (A)) of the ZATU and of the NOR in its observatories (i.e. radioactive mineral springs (B))

Zones Ateliers
LTSER FRANCE TERRITOIRES URANIFERES

ID Card:

Type of ecosystem contaminated:
Wetland, forest, natural springs

Compartment of environment contaminated:
Water, soil, sediments

Contamination source:
NOR and TE-NOR (U, Ra, Rn, Po)

Radioactivity or dosimetric characteristics:
Concentrations: e.g. 2000 ppm ^{238}U, 40 Bq/g ^{226}Ra, 4 kBq/L ^{222}Rn....
Dose rates: up to 2000 nSv h^{-1}

Total contaminated area:
Watershed, ~5 km^2

Species exposed/present in the site:
Microorganisms, diatoms, chickadees, invertebrates, trees...

Authorized related data/samples:
Permission to access and work at the site has to be obtained *via* ZATU and is subject to signature of a working agreement. Contact Patrick.chardon@clermont.in2p3.fr.

Presence of an associated contamination:
Heavy metals (As, Pb, ...)

Supporting lab:
No laboratory infrastructure available on site.

Address:
LTSER "Zone Atelier Territoires Uranifères", Clermont-Ferrand, France

Internet link:
https://zatu.org/

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Related to:
ALLIANCE

The effect of natural radioactivity on diatom communities in mineral springs, Millan F., Izere C., Breton V., Voldoire O., Biron D. G., Wetzel C. E., Miallier D., Allain E., Ector L., Beauger A. (2019), Bot Lett, 167 (1), 95-113

Uranium quantification of oak tree rings (*Quercus petraea*) from a former uranium mining site by High Resolution Inductively Coupled Plasma Mass spectrometry in Laser Ablation and Solution modes, Loni Y. H., David K., Larrue S., Grambow B., Corona C. et al. (2019), Spectrochim Acta B, 161, 105709

The 'hematopoietic system' database for Mayak nuclear workers chronically exposed to ionizing radiation

Hematopoietic effects following chronic radiation exposure

The hematopoietic system is known to be highly sensitive to ionizing radiation. A number of papers describe effects of acute radiation exposure in the hematopoietic system considering various populations. Meanwhile, studies of hematopoietic effects induced by chronic low-dose radiation exposures are sparse.

To facilitate studies of dose and dose rate effects of chronic occupational exposure on the human hematopoietic system we developed a database for hematopoietic data for the worker cohort employed at the Mayak PA, the first Russian nuclear production facility. The cohort was described in details earlier [1, 2]. It should be highlighted that the medical follow-up of the workers was performed since the very first days of the Mayak PA operation and included a pre-employment and regular mandatory examinations by various medical specialists and laboratory tests.

In 1948-1953 complete blood counts were performed 4 times a year, in 1954-1960 – 2 times a year and after 1961 – once a year through the entire follow-up. If persistent changes in hematological parameters were observed for a worker, he/she was examined by a haematologist and, if need, a sternal puncture and/or trephine biopsy were carried out. This unique monitoring allowed to collect a lot of raw clinical data on the hematopoietic system. Structurally the medical and dosimetry database 'Clinic' contains a number of blocks that directly correspond to the hematopoietic system, such as 'Incidence', 'Peripheral blood', 'Red bone marrow'.

'Incidence' block stores data on all diseases experienced during the follow-up period including a first diagnosis date, detailed diseases statements, a diseases code in accordance with the International Classification of Diseases (ICD-9).

'Peripheral blood' block stores the following data: examination date, quantitative counts of the morphological blood content (RBC, WBC, PLT and others).

'Red bone marrow' block stores raw data on RBM analyses: examination date, myelogram results and a hematologist's conclusion.

Photo: SUBI

Dr. Tamara V. Azizova

As of 31.12.2019, 212 tumors of the lymphoid and hematopoietic tissues and 3180 blood and blood-forming organ diseases were verified in the study cohort. The Table below provides the totality of hematopoietic data in the 'Clinic' database as of 31.12.2019.

To sum up, the database for the hematopoietic system developed at SUBI might be used for future updates of risks of early and late effects in the human hematopoietic system, such as tumors of the lymphoid and hematopoietic tissues and diseases of the blood and blood-forming organs related to radiation exposure, for dose-response and dose-rate-response assessments considering non-radiation factors, for estimations of dose thresholds and associated uncertainties for certain tissue reactions occurring in the lymphoid and hematopoietic systems due to chronic low dose-rate radiation exposure, and for investigations of mechanisms of chronic exposure effects on the human hematopoietic system, etc.

Photo: SUBI

Descriptive characteristics	Males	Females	Both sexes
Complete blood counts			
Number, total	381246	172682	553928
Portion of individuals for whom counts were performed, %	8289 (95.09%)	3358 (93.83%)	11647 (94.72%)
Mean number of counts per person ± SE (minimum : maximum)	45 ± 39.98 (1 : 347)	51 ± 43.92 (1 : 327)	47 ± 41.23 (1 : 347)
RBM examinations			
Number, total	3647	2192	5839
Portion of individuals for whom examinations were carried out, %	1084 (12.44 %)	642 (17.94 %)	1726 (14.04 %)
Mean number of examinations per person ± SE (minimum : maximum)	3.00 ± 2.46 (1 : 20)	3.00 ± 2.62 (1 : 26)	3.00 ± 2.52 (1 : 26)

Data on complete blood counts and bone marrow examinations provided by the 'Clinic' database as of 31.12.2019

ID Card:

Database topic:
Radiation epidemiology, radiobiology

Information available type:
Type of exposure, doses, dose rates, demographic data, family history, medical history, occupational history, social habits, etc.

Data type:
Cohort data

Link with a biobank:
Radiobiological Human Tissue Repository (RHTR)
http://rhtr.subi.su/

Access:
The database is owned by SUBI. Access to anonymous data is limited and should be approved and granted by SUBI Institutional Review Board.

Contact:
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azizova@subi.su
+7-35130-29395

Southern Urals Biophysics Institute, Ozyorskoe shosse 19, 456780 Ozyorsk, Chelyabinsk region

Related to:
MELODI

[1] Mayak PA worker cohort (MWC), Azizova T. V. (2018), AIR^2 Issue n°28, P3

[2] The "Clinic" medical-dosimetric database of Mayak production association workers: structure, characteristics and prospects of utilization, Azizova T. V., Day R. D., Wald N., Muirhead C. R., O'Hagan J. A., Sumina M. V., Belyaeva Z. D., Druzhinina M. B. et al. (2008), Health Phys, 94 (5), 449–458

AIR²

Access to INFRASTRUCTURES

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	Pulex 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 TransferDatabase	Radiobiology and immunology platform (CTU-FBME)
May2016, #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
Sep 2016, #10	Facility radionuclides availability, transfer and migration	INWORKS cohort	France Génomique
Oct 2016 #11	LIBIS gamma low dose rate facility ISS	JANUS	Transcriptomics platform SCKCEN
Nov 2016, #12	Microtron laboratory	EPI-CT Scan cohort	CATI
Dec 2016, #13	Nanoparticle Inhalation Facility	UEF Biobanking	The Analytical Platform of the PREPARE project
Feb 2017, #14	Infrastructure for retrospective radon & thoron dosimetry	Chernobyl Tissue Bank	HZDR Radioanalytical Laboratories
Special Issue 1	1st CONCERT Call: CONFIDENCE, LDLensRad, TERRITORIES	1st CONCERT Call: CONFIDENCE, LDLensRad, TERRITORIES	1st CONCERT Call: CONFIDENCE, LDLensRad, TERRITORIES
Mar 2017, #15	Alpha Particles Irradiator Calibration Laboratory at KIT		SYMBIOSE
Apr 2017, #16	Changing Dose rate (SU) Low dose rate (SU)		Advanced Technologies Network Center
May 2017, #17	Chernobyl Exclusion Zone	Chernobyl clean-up workers from Latvia	BfS whole and partial body Counting
Jun 2017, #18	MELAF	Belgian Soil Collection	INFRAFONTIER
Jul 2017, #19	MICADO'LAB	Estchern Cohort	ECORITME
Sep 2017, #20	DOS NDS		CERES
Oct 2017, #21	CALLAB Radon Calibration Laboratory		CORIF
Nov 2017, #22	Calibration and Dosimetry Laboratory (INTE-UPC)	German airline crew cohort	Centre for Omic Sciences (COS)
Dec 2017, #23	NMG	Techa River Cohort (TRC)	iGE3
Special Issue 2	MEDIRAD	MEDIRAD	MEDIRAD
Feb 2018, #24	UNIPI-AmBe	Greek interventional cardiologists cohort	SNAP

Future events:

CONCERT Short Courses

18-29 May 2020

Modelling radiation effects from initial physical events, University of Pavia, Italy

Contact: Andrea Ottolenghi

To verify for possible modifications due to the COVID-19 outbreak!

See also on CONCERT website

Editorial Committee: Maria Panagiotopoulou, Jean-Michel Dolo, Laure Sabatier

Special Issue 10

April 2020

AIR²

Access to INFRASTRUCTURES

Issue	Exposure platforms	Databases, Sample banks, Cohorts	Analytical platforms, Models & Tools
Published to date:			
Special Issue 3	2nd CONCERT Call: LEU-TRACK, PODIUM, SEPARATE, VERIDIC, ENGAGE, SHAMISEN-SINGS	2nd CONCERT Call: LEU-TRACK, PODIUM, SEPARATE, VERIDIC, ENGAGE, SHAMISEN-SINGS	2nd CONCERT Call: LEU-TRACK, PODIUM, SEPARATE, VERIDIC, ENGAGE, SHAMISEN-SINGS
Mar 2018, #25	IRRAD	MARiS	BIANCA
Apr 2018, #26	Forest observatory site in Yamakiya	BBM	OEDIPE
May 2018, #27	Belgian NORM Observatory Site	The German Thorotrast Cohort Study	VIB Proteomics Core
Jun 2018, #28	CERF	Mayak PA worker cohort	Geant4-DNA
Jul 2018, #29	TIFPA	RHRTR	D-DAT
Sep 2018, #30	HIT	The TRACY cohort	COOLER
Oct 2018, #31	PTB Microbeam	The BRIDE platform	BRENDA
Nov 2018, #32	AGOR Facility at KVI-CART LNK		MARS beamline at SOLEIL
Dec 2018, #33	PARISII	The ISIBELa cohort	CIEMAT WBC
Feb 2019, #34	The MIRCOM microbeam	The ISE cohort	EFFTRAN
Special Issue 4	NSRL	LSAH & LSDA	GeneLab
Mar 2019, #35	IRSE Experimental Farm	The MWF database	DSA Environmental Laboratory
Apr 2019, #36	PG stack at Barreiro, Portugal	CONSTANCES	The MCDA Tool
May 2019, #37	LERF	IMMO-LDRT01 cohort	Radiochemical and Radioactive Analysis Laboratory (INTE-UPC)
Jun 2019, #38	FAIR	The BACCARAT study	CIEMAT *In Vitro* Internal Dosimetry Laboratories
Jul 2019, #39	AMBIC	LSS	LRM
Sep 2019, #40	FRM II	REQUITE	TU Dublin Analytical Platform
Special Issue 5	CONFIDENCE	CONFIDENCE	CONFIDENCE
Special Issue 6	PODIUM	PODIUM	PODIUM
Special Issue 7	LDLensRad	LDLensRad	LDLensRad
Special Issue 8	ENGAGE	ENGAGE	ENGAGE
Special Issue 9	LEU-TRACK	LEU-TRACK	LEU-TRACK
Special Issue 10	CIEMAT External Dosimetry Service and Retrospective Luminescence Dosimetry Lab, AIFIRA Microbeam, The Calliope Facility, ZATU	The 'hematopoietic system' database for Mayak nuclear workers chronically exposed to ionizing radiation	

Future events:

Other Events

5-8 May 2020

1st ISORED scientific and organisation meeting, Sitges, Spain

27-29 May 2020

6th NERIS workshop: Operational and research achievements and needs to further strengthen preparedness in emergency management, recovery and response, Barcelona, Spain

28 September-2 October 2020

ERPW2020: European Radiation Protection Week 2020, Estoril, Portugal

Extended deadline for abstract submission:

30 April 2020

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