The European Radioecology Alliance:
Encouraging the Coordination and Integration of Research Activities in Radioecology

www.er-alliance.org

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EUROPEAN RADIOECOLOGY ALLIANCE

ICCE-2017, June 20, 2017, Oslo, Norway

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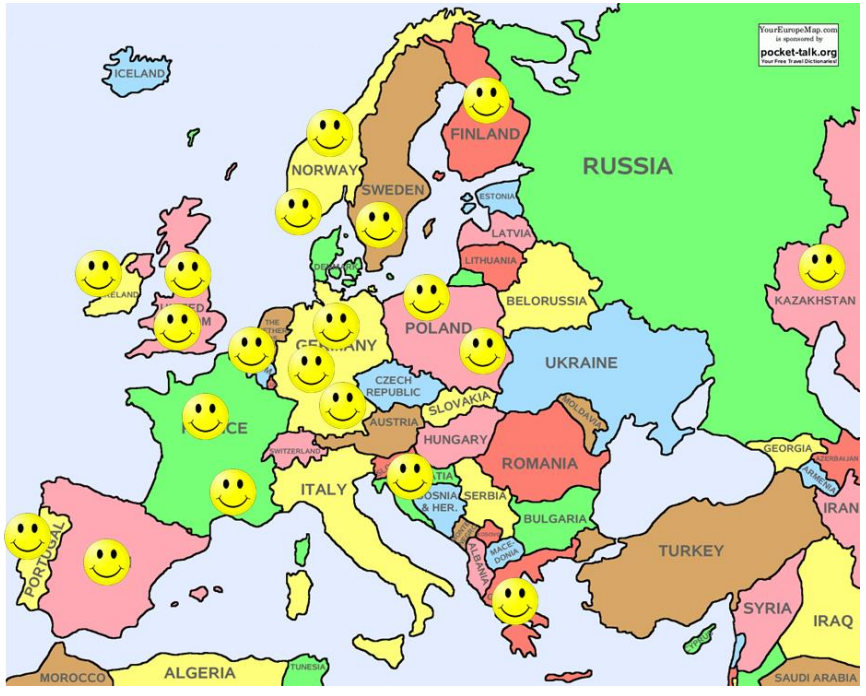
COordination and iMplementation of a pan European instrumenT for Radioecology

The European Radioecology Alliance

- The ALLIANCE was founded in 2009 to develop a vision on long-term research needs in radioecology, to foster cooperation and to assure sustainability of radioecology .
- Objectives:
  - Coordinate and promote research in Radioecology
  - Act as a Research Platform: Definition of priorities and research programmes
  - Promotion and Communication
- Members of the ALLIANCE
  - 8 founding members in 2009
  - 27 members from 14 countries in June 2017



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A Major Tool: the Strategic Research Agenda (SRA)

- An SRA is vital to get sufficient priority in scientific programming and to maintain visibility of radioecology

STAR
STRATEGY FOR ALLIED RADIOECOLOGY

(2011 – 2015) Coordinated by IRSN

www.star-radioecology.org

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(2013 – 2017) Coordinated by SCK•CEN

www.comet-radioecology.org

- SRA highlights 3 challenges for radioecology

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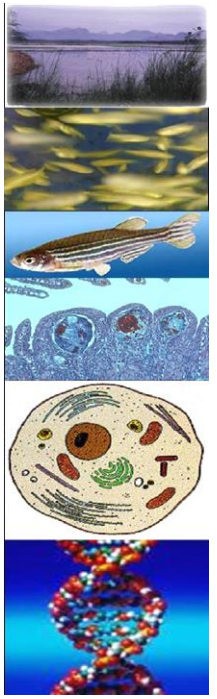
SRA highlights 3 challenges for radiecology

- Predict human and wildlife exposure in a robust way by quantifying key processes that influence radionuclide transfers and exposure.

- Determine ecological consequences under realistic exposure conditions



- Improve human and environmental protection by integrating radioecology

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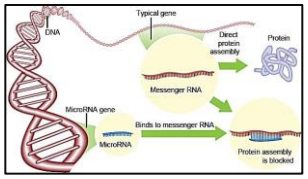
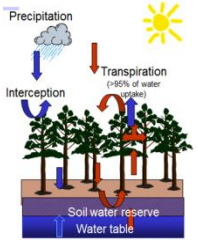
Radioecology: How?
A holistic research methodology





Process-understanding
&
Scientific expertise

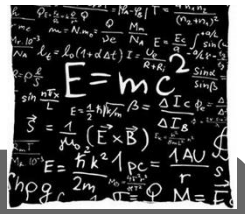
Experimental evaluation of processes

Using mathematical tools to understand and describe processes

Risk assessment
Remediation/CM

Practical applications

Models/tools for e.g. impact assessment



Experimental based research

Mathematical based research

Defining and generating input data for mathematically expressing processes

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1/6/2013 – 31/05/2017

EURATOM

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STUDIECENTRUM VOOR KERNENERGIE
CENTRE D'ETUDE DE L'ENERGIE NUCLEAIRE

STUK

IRSN
INSTITUT
DE RADIOPROTECTION
ET DE SÛRETÉ NUCLÉAIRE

CEH Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

Statens strålevern
Norwegian Radiation Protection Authority

GIG

GOBIERNO DE ESPAÑA · MINISTERIO DE CIENCIA E INNOVACIÓN · Ciemat
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas

Stockholms universitet

Bundesamt für Strahlenschutz

UAB
Universitat Autònoma de Barcelona

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University of Zurich[UZH]

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UNIVERSIDAD DE SEVILLA

DTU
Technical University of Denmark

ansto

CHORNOBYL center

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COMET

COMET objectives

COMET overall objective: strengthen the pan-European research initiative in radioecology by:

- Developing innovative mechanisms for joint programming and implementation (JPI) for radioecological research → **from SRA to roadmap**
- Initiating innovative research on key needs
- Develop strong mechanisms for knowledge exchange and dissemination to enhance and maintain European capacity, competence and skills in radioecology.

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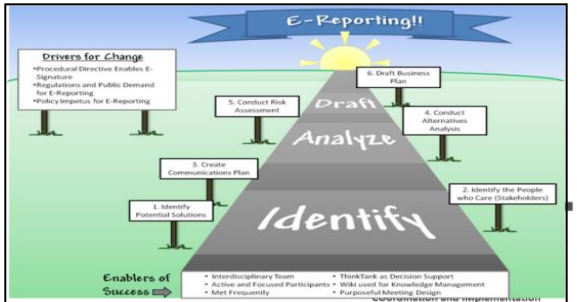
From SRA to Roadmap

- ***ALLIANCE with COMET*** develops roadmap for radioecology
- ***Strategy/Overall Objective:*** Underpinning science for an enhanced basis for fit-for-purpose human and environmental impact assessment by mechanistic modeling, improved parametrization, improved databases
- **Scoping:** from basic science (mechanistic understanding) to application, interlink the different SRA Challenges, interact with other Radiation Protection platforms (facilitated by CONCERT)
- **Criteria for prioritisation** Impact, Relevance, Achievable, Good science
- **For priority areas:** scope and objectives defined, participants identified, implementation plan developed. External funding searched for.
- 5 **topical roadmap** (working groups) identified



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Priority domains for roadmap development

- **Marine radioecology** Fukushima accident showed lack of robust marine radioecological models
- **Human food chain modelling** actual DSS to be adapted to other regions of Europe and radioecological models to be improved;
- **Atmospheric radionuclides in transfer processes**: Fukushima accident highlighted several lacks in air transport and inhalation dose assessment, deposition stage from atmospheric releases or long-lasting secondary emissions
- **NORM radioecology**: NORM sites often close to settlements requiring follow up and appropriate remediation
- **Transgenerational effects and species sensitivity**: major concern of long-term biological effects of low radiation doses → improve our knowledge on long term/transgenerational effects and on basis for differences of radiation sensitivity

COMET – Innovative research in support of roadmap
Improving and validating radioecological models

Marine modelling – intended activities The roadmap has been oriented to improve knowledge and representation of radionuclide dispersion and transfer processes in marine environment.

Radiological background and Marine dispersion modelling

Radioecological transfers to biota / to sediments

Fukushima case study

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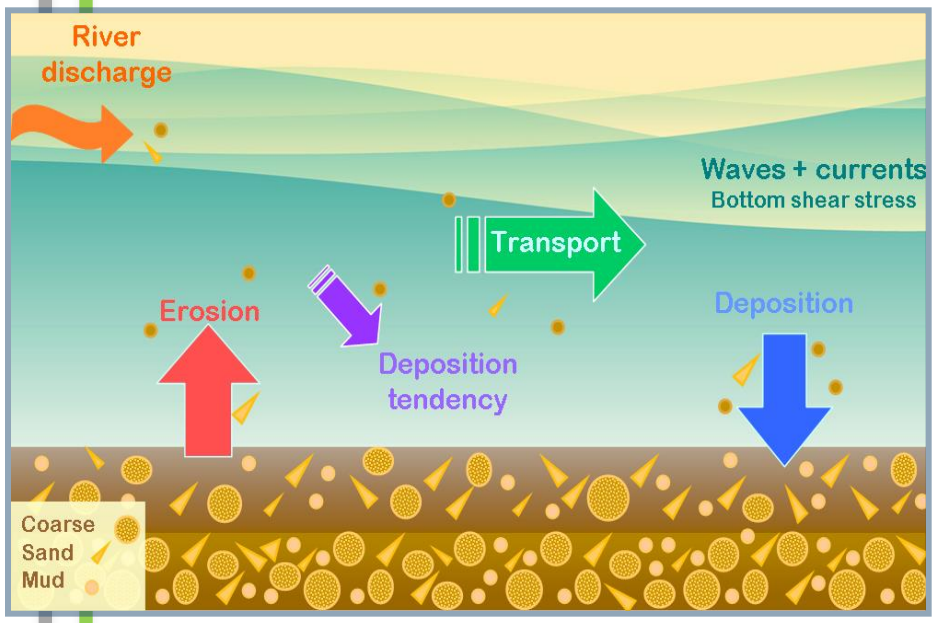
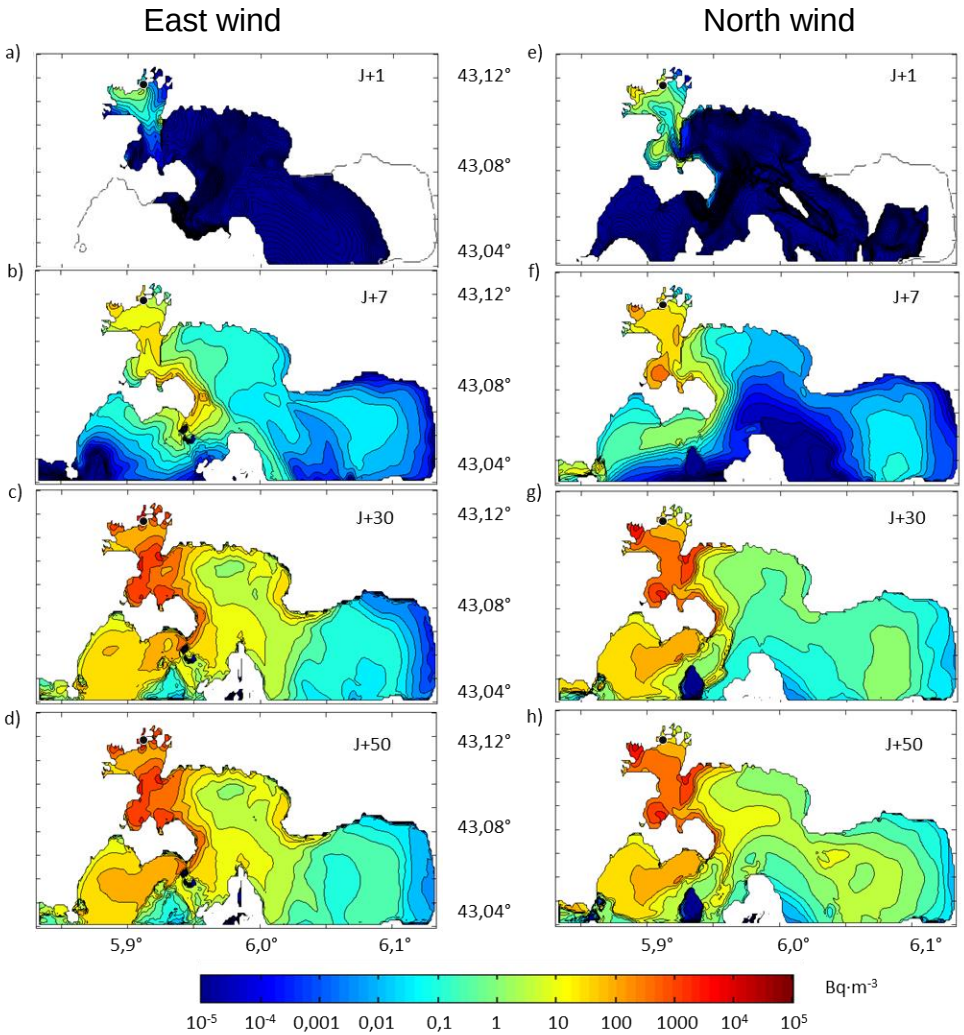
Improvement of dispersion models including sediment interactions



Sediment ^{137}Cs activity pattern after an hypthetical accidental liquid release from Toulon harbour



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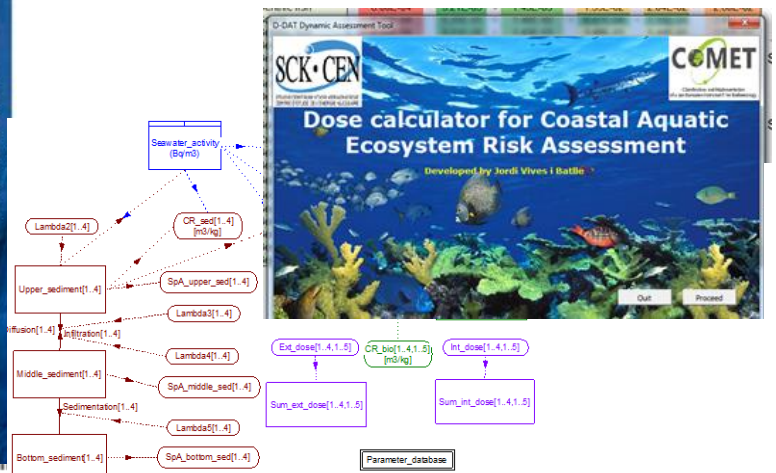
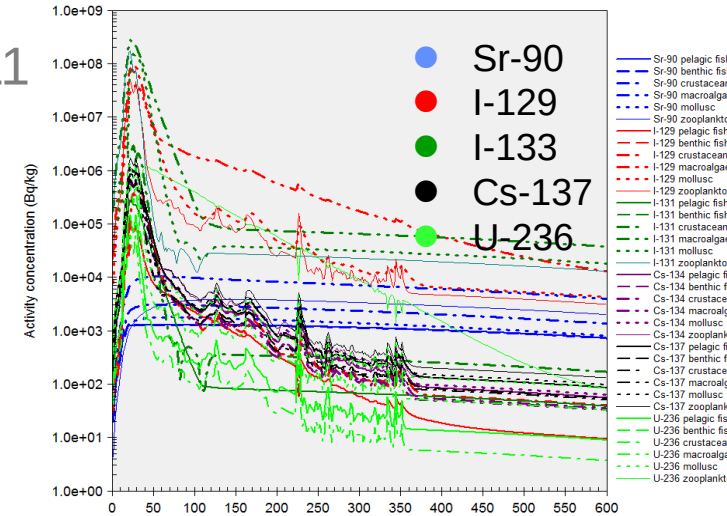
Impact of releases from the Fukushima nuclear accident on marine environment

Better understand sources, fate, transport, bioaccumulation and associated impact of radionuclides

- Fate of contamination in ocean: Fraction of total releases stored in marine sediments; Aerial extent of contamination in seafloor
- Radioactivity leaking from the Dai-ichi site
- Concentration change in ocean since 2011
- Current impacts on marine biota.





- Calculated sediment, biota conc match with measured.
- Model reduces excess conservatism of assuming equilibrium.
- No population effects expected

COMET – Innovative research: Epigenetic changes and their possible effect on adaptation and transgenerational effects

Different subtasks identified

- Task 1 Biomarkers of transgenerational/adaptation effects
- Task 2 Radioadaptation
- Task 3 Role of metabolism in transgenerational /adaptation effects

➔ task 1 (and 2) integrated within COMET WP4

➔ task 1,2 and 3 are part of BIOMARKERS, a new project to be submitted in response to CONCERT call 2





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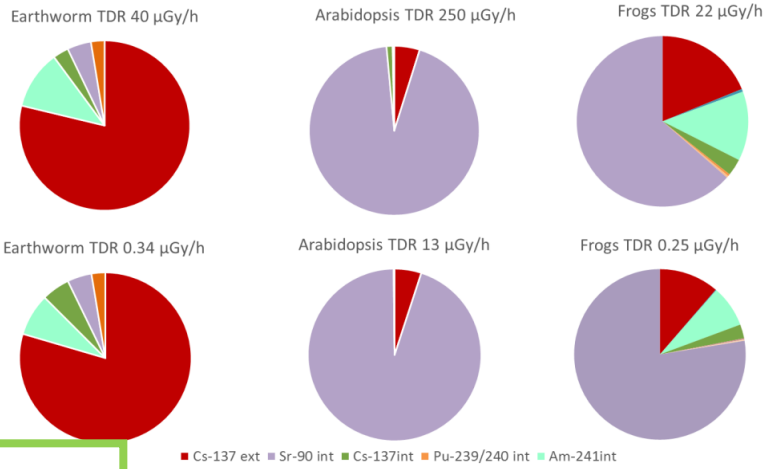
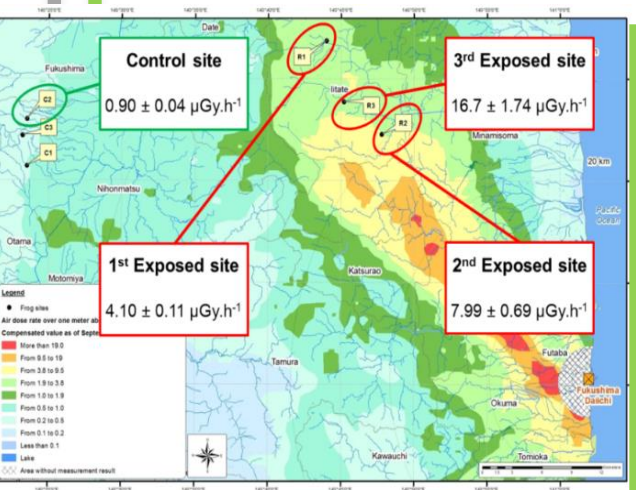
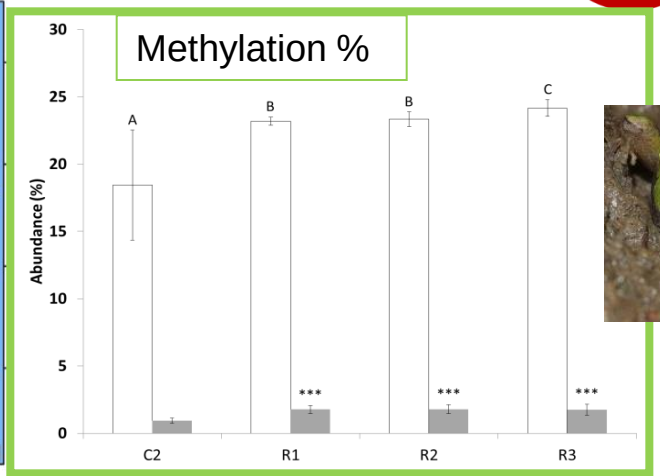
COMET – Innovative research: Epigenetic changes and their possible effect on adaptation and transgenerational effects

- What is biological and evolutionary significance of epigenetic changes following exposure to ionizing radiation?
- Do epigenetic changes contribute to transgenerational effects of radiation exposure in different organisms?
- Lab (plant Ath– zebrafish) and field experiments (plant, earthworm, fish,frog – CEZ/FEZ)
- Importance of robust dosimetry →







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Sustainable cooperation in Observatory Site (OS) WGs

Radioecological Observatories - contaminated field sites that provide a focus for long-term joint field investigations: maximise sharing of data and resources and provide excellent training and educational sites

Four contaminated sites selected under STAR & COMET

- Chernobyl Exclusion Zone
- Aquatic environment of previous coal mining & processing site in Poland
- Forest in Fukushima prefecture in Japan
- Waste landfill "Kepkensberg" from Belgian phosphate industry

Observatory working groups established under ALLIANCE to ensure the continuation of the work at the Radioecological Observatories

OS-specific R&D plan will be developed

CEZ (OS in CONFIDENCE) and Kepkensberg (OS in TERRITORIES)

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Workshops and training courses

Focussed workshops

- Transgenerational and Epigenetic Mechanisms of Radiation Toxicity at Chronic Doses (Oxford 2014)
- ICOBTE conference special session and Fukushima COMET workshop (Japan 2015)
- *Models fit for purpose (Seville 2016)*
- *Thirty years after the Chernobyl accident what do we know about the effects of radiation on the environment? (Chernihiv, Ukraine 2016)*

Training courses

- Naturally occurring radioactive material (NORM) in the environment (Poland 2015)
- *Field course on Chernobyl fallout in the environment (Ukraine 2016)*
- *Refresher courses (ICRER 2014, IRPA 2016)*

https://wiki.ceh.ac.uk/display/radex/Training+courses

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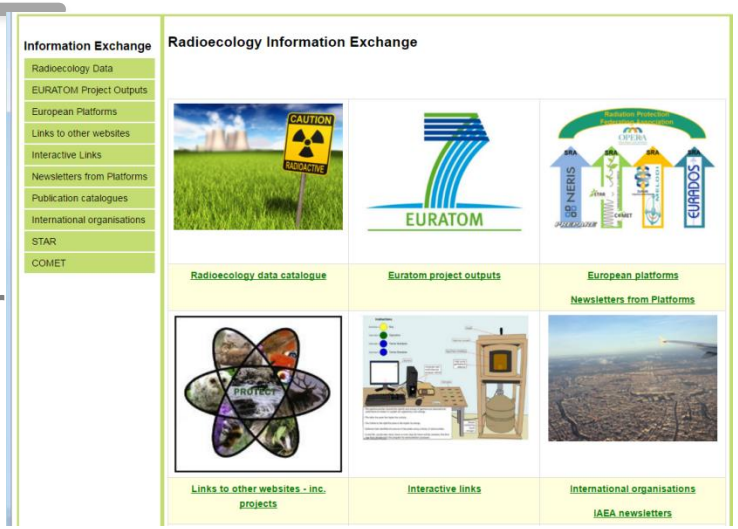
Dissemination and communication
The Radioecology Exchange

- Significant resource for radioecological information & news
- Radioecology Exchange will remain as repository and as mechanism for ALLIANCE members to communicate their activities: www.radioecology-exchange.org
- @RadioXchange *Twitter* account
- *Facebook* page https://www.facebook.com/radioecology/
- The Radiation Protection Week, GAs, dedicated workshops and training events, …



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Interactions with the European Radiation Protection community

- Interaction of ALLIANCE with other European Radiation Protection Platforms important → continue
- Today mostly mediated through EJP CONCERT → ALLIANCE active interaction for updating SRAs and roadmaps, infrastructure, E&T, stakeholder involvement, organisation of the Radiation Protection Week

- ALLIANCE will also liaise and interact with radioecology related EURATOM projects to ensure that project outcome is not again dispersed but centred and consolidated by the ALLIANCE

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Interactions with outside bodies
European & int'l platforms, projects

In the future the ALLIANCE will

- Continue involvement in EJP-CONCERT and similar future EJPs and represent the wider radioecological community, and be responsible for integrative activities (SRA's and Roadmaps, science direction, call preparation, …)
- Interact with European projects linked with radioecology (e.g. TERRITORIES, CONFIDENCE, …) to take up, disseminate and consolidate advances in radioecology R&D
- Continued interaction with international RP organisations with link with radioecology (ICRP, IAEA, IUR, IRPA, …) and develop mechanisms and scope of effective collaboration
- Follow-up evolution in European platforms with link with radioecology (IGD-TP/JOPRAD, EURAMET, NUGENIA) and be open for interaction

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Conclusions

- The ALLIANCE has a solid basis, having expanded from the initial 8 founding members to 27 members from 14 countries in January 2017
- The funding available under COMET has helped the ALLIANCE to function and to develop its structural basis
- In short term the work to promote radioecology will continue under the Euratom EJP-CONCERT (2015-2020)
- Sustainability and further integration need continuing efforts, with an emphasis on high-level R&D and E&T of next generation of scientists and experts and further exploration of new modes of cooperation
- External funding is required as seed money for sustainability and in order to be able to answer emerging research needs

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Thanks to …

- ALLIANCE members, COMET partners, Scientific Committee
- EC for finance
- You for listening

The ALLIANCE is open to new members

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