



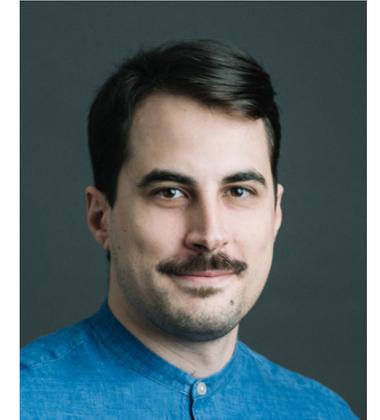
RadCon

Radiation Consultants

**Who's RadCon?**

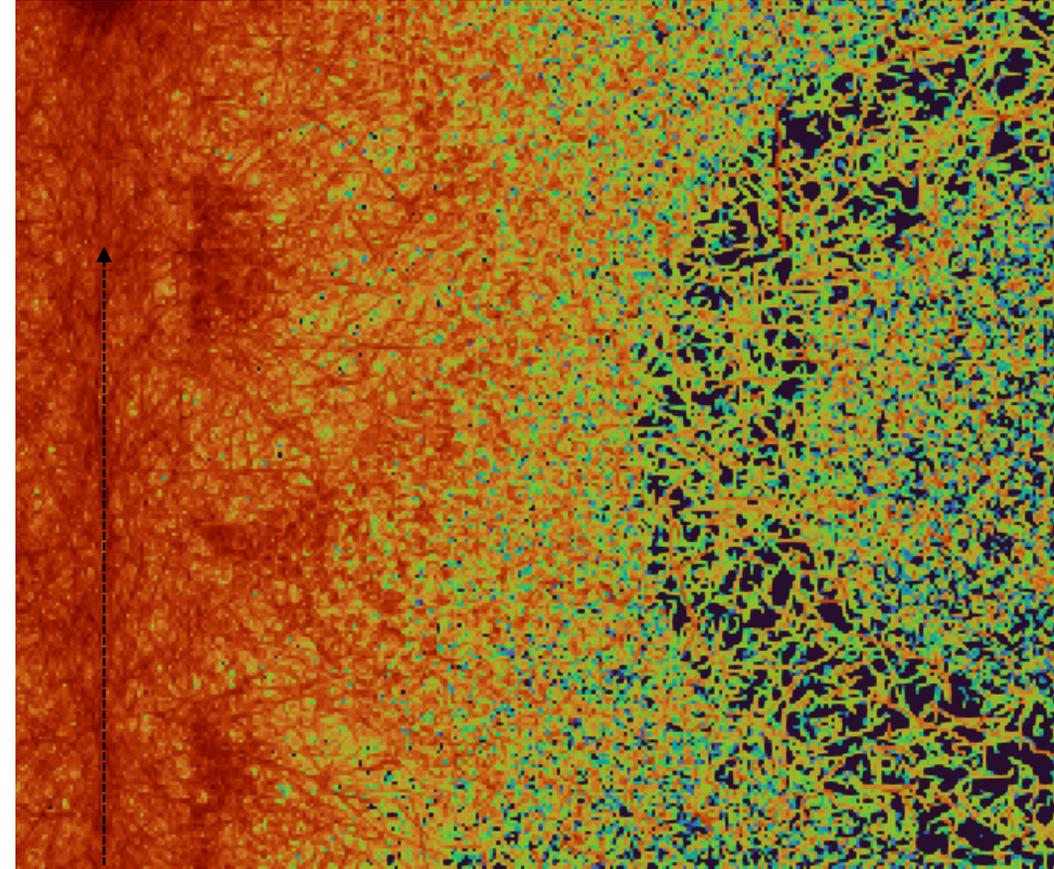
## RadCon GmbH

- Founded 2023, May in Augsburg, Germany
- 5 Consultants
  - **Mauritius Hiller**  
Physicists, Monte-Carlo-Modeling, Variance Reduction, Retrospective Dosimetry, Computational Dosimetry
  - **Simon Rombauer**  
Physicists, Monte-Carlo-Modeling, Advanced Reactors
  - **Natascha Semioschkina**  
Physicists, Radioecology, Modeling
  - **Gabriele Voigt**  
Biologist, Radioecology, Modeling
  - **Franz Wagner**  
Physicists, Reactor Physics, Radiation Protection, Medical Physics



## Monte-Carlo Modeling

- Using MCNP6.3, SCALE and PHITS code packages
- Advanced Experience in
  - Radiation shielding and deep penetration problems
  - General radiation transport problems
  - Nuclide inventory and burn-up calculations
  - Variance Reduction methods to enhance computational performance
- Further experience in various application, such as
  - Reactor development: Neutronics, activation, shielding
  - Spent Nuclear Fuel (snf) dry storage cask development: Assessment of shielding, inventory, criticality of snf in cask, load planing, analysis of independent snf storage installation (ISFSI)
  - Assessment of shielding properties of buildings, nuclear safety appliances, medical applications



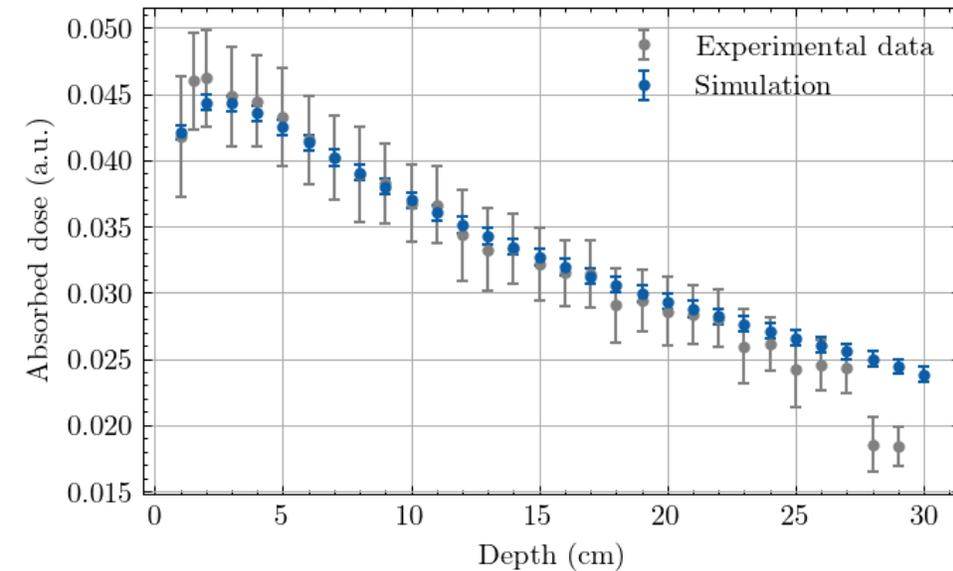
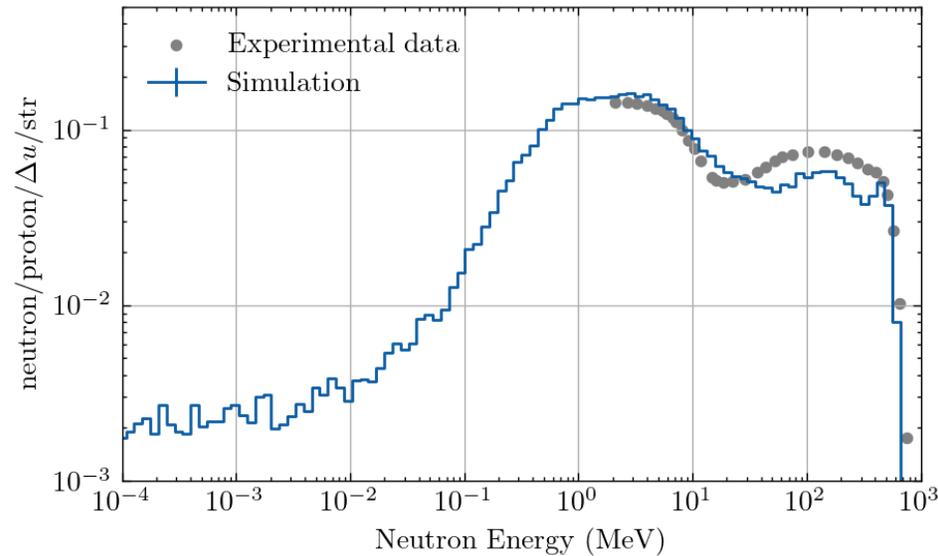
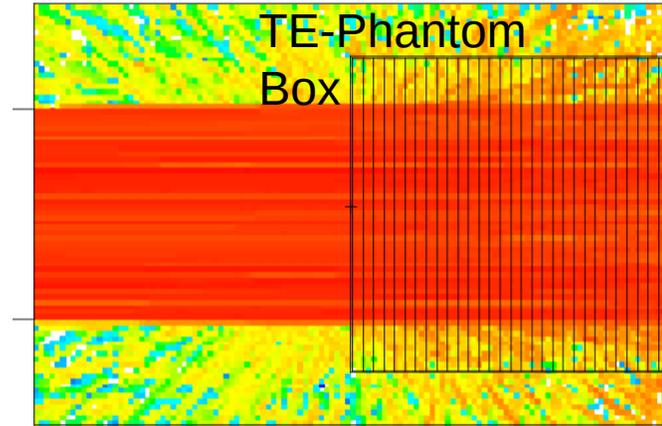
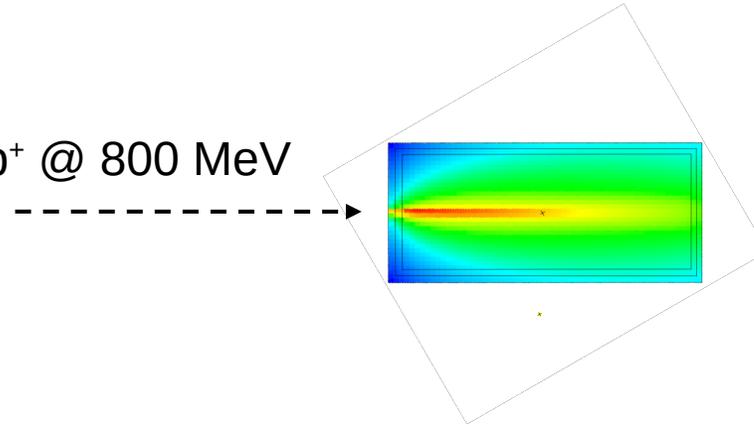
neutron  
beam

Secondary electron flux from a neutron beam through R  
of RC-Logo

## Monte-Carlo Modeling - Example

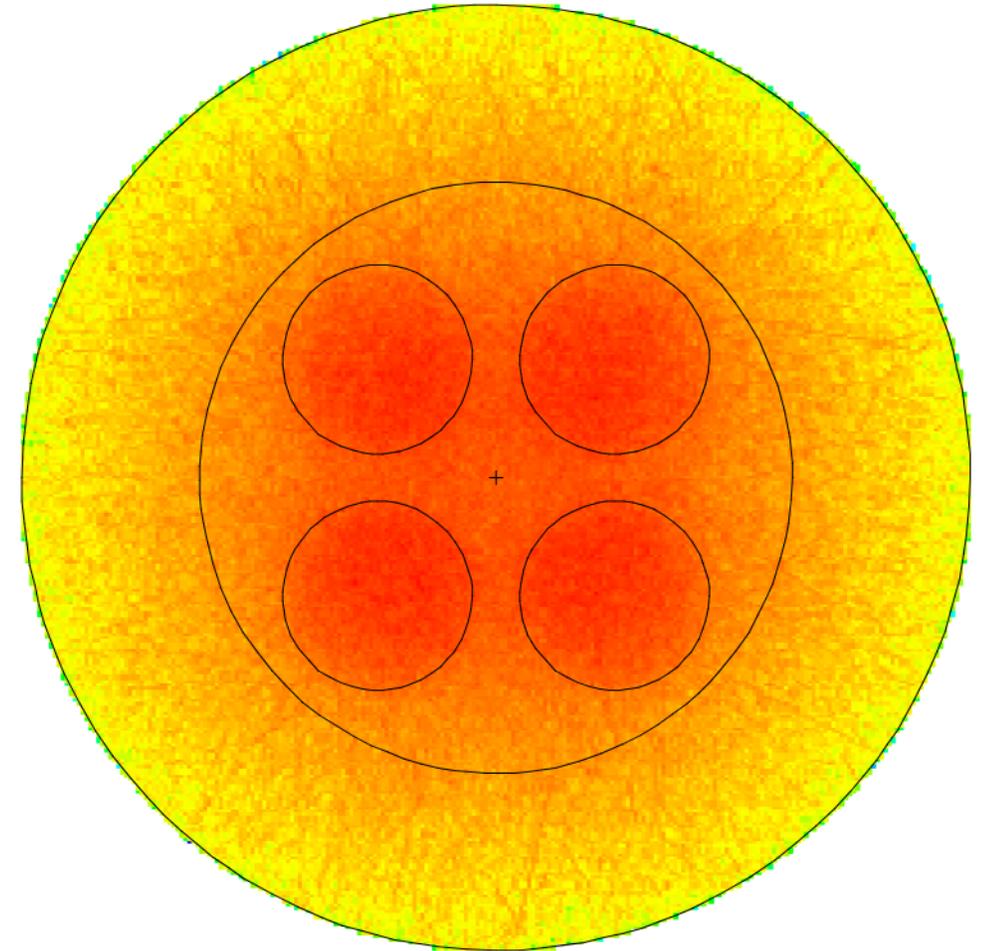
- Neutron beam into tissue-equivalent phantom box to calculate depth-dose
- Spallation target: tungsten, hit by 800 MeV protons
- Monte-Carlo neutron spectra extends measurable energy range

$p^+$  @ 800 MeV



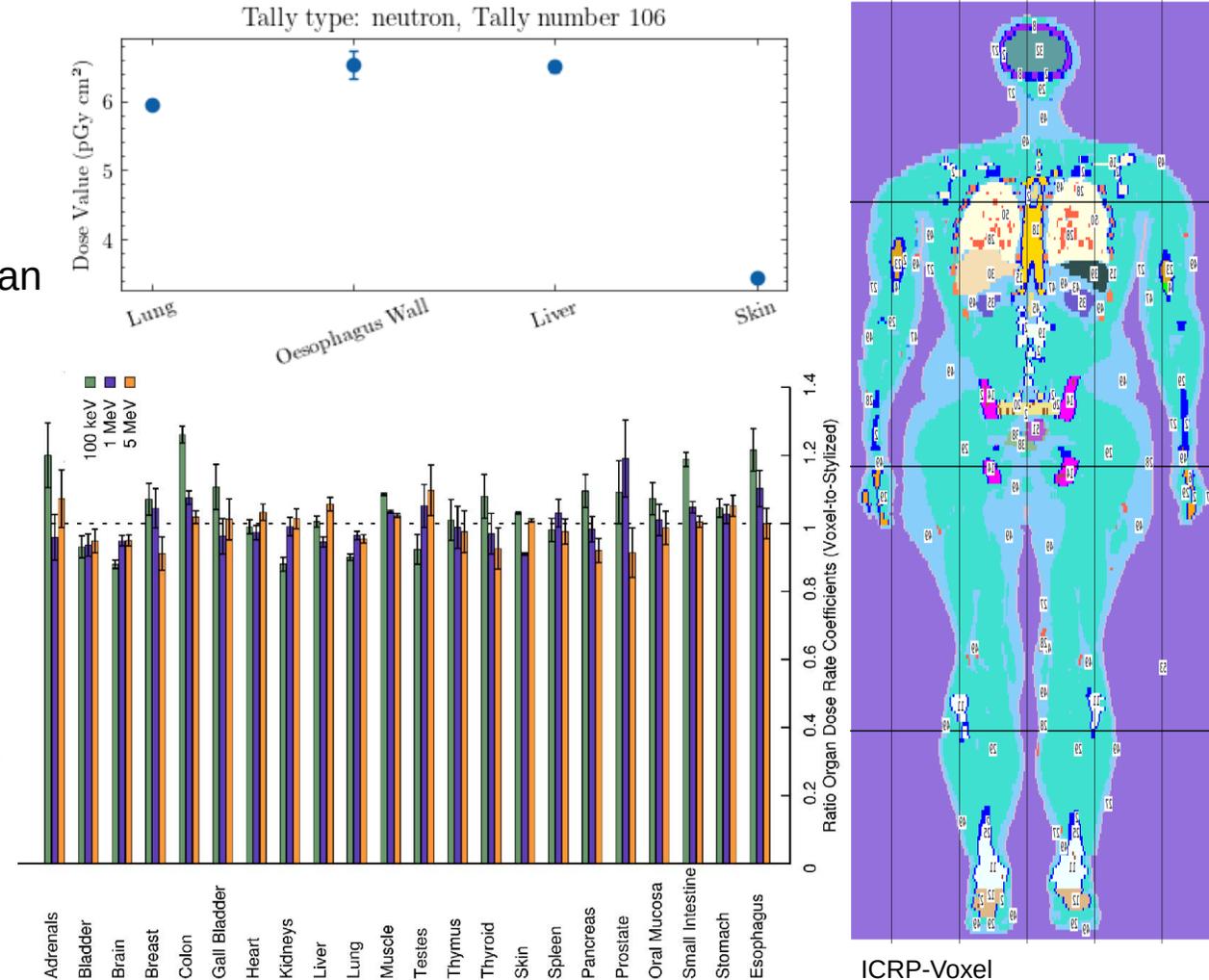
## Monte-Carlo Modeling – Advanced Reactor Development

- RadCon supports the development, manufacture and operation of advanced reactor concepts, specifically Small Modular Reactors (SMRs).
- SMRs offer flexibility and affordability with enhanced safety performance
- Can play a vital role to reach the net zero carbon emission goal
- RadCon supports emerging companies with knowledge related specifically to reactors and to involved physics more generally
- Simulation of reactor operation and assessing criticality, burn-up, fission products and activation inventories. Assisting developments of reactors and to collect necessary data for application processes with national authorities



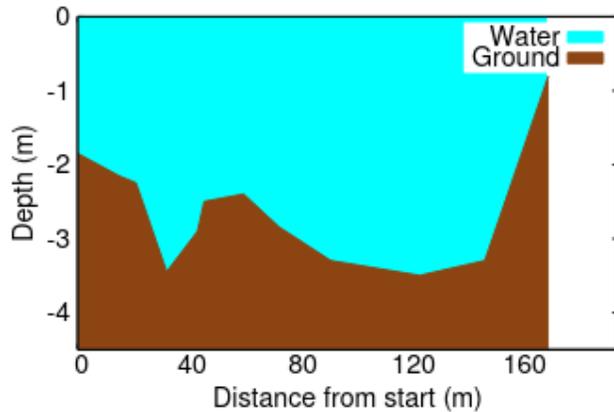
Monte-Carlo Modeling – Computational Dosimetry

- Computation of radiational doses in human and non-human biota by means of Monte-Carlo codes
- Enabling Health Physicists to protect people and the environment
- RadCon uses detailed anatomical representations of the human body depending on use case: stylized, ICRP-Voxel and advanced ICRP 156 pediatric, ICRP 145 adult Mesh-type phantoms
- Assessing doses on individual organs and in the most challenging environments
- Enhances the safety of medical, environmental, research and industrial applications
- Extensive experience with ICRP-Voxel and stylized phantoms
- Computations for non-human biota using ICRP Reference Animals and Plants (RAPs)

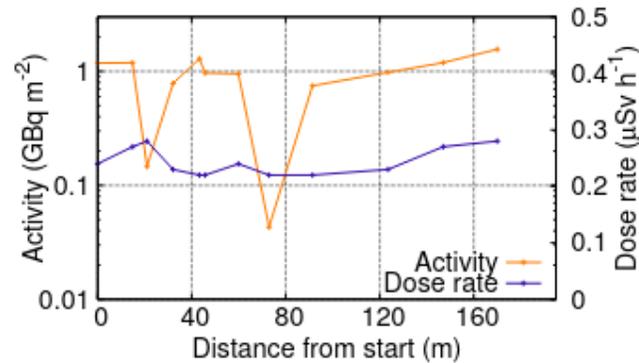


### Monte-Carlo Modeling – Retrospective Dosimetry

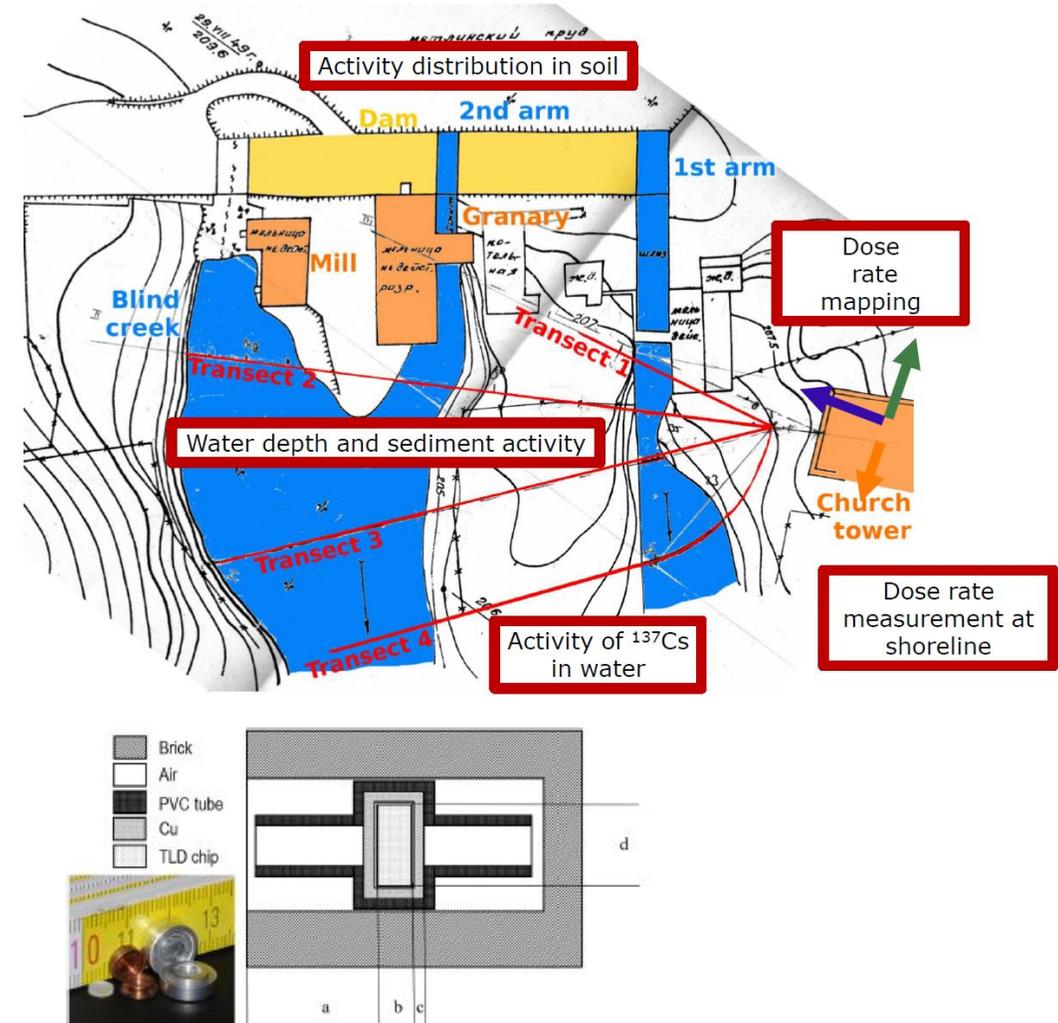
- Reconstruction of contermination by means of field work and Monte-Carlo simulations
- Work done on
  - Techa River (Russia) studies
  - Supporting the EU funded SOUL and SOLO projects
  - Supporting the US DOE funded JCCRER project



a. Transect 1, depth

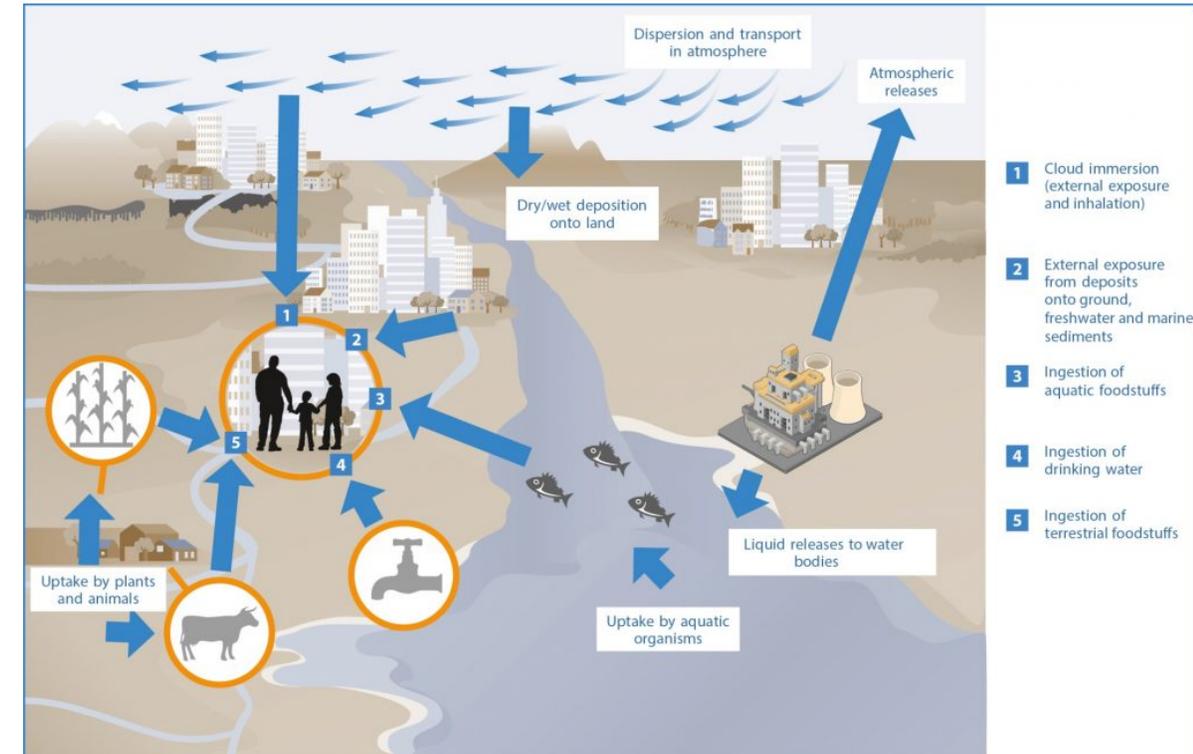


b. Transect 1, activity, dose rate



## Radio Ecology

- Study of the effects of radiation on ecological entities
- Radiactivity as a stressor, requiring risk assessment but also as tracer of biogeochemical and ecological processes
- Our work in this field includes:
  - identification of relevant pathways
  - measurements
  - modeling
  - dose assessment
- RadCon can support activities in radioecology by:
  - providing training and lectures
  - supporting and coordinating radioecological research activities
  - aiding the assessment of site-specific past, present and future radiation levels and remediation strategies
  - identifying available radioecological models and environmental decision support systems for radionuclide transfer and impact assessment



## Radio Ecology – Database of Radioecological Parameters for Arid Environments

- RadCon has developed a Database of Radioecological Parameters for Arid Environments.
- It contains information on the development, structure, and application of radioecological parameters, emphasizing their role in supporting predictive modelling, environmental impact assessments, and decision-making during emergencies.
- The main objective of the database is to provide the user with so-called Transfer-Factors which indicate the amounts of a radionuclide that is transferred from one compartment to the next within a given time. These compartments include, for example, soil, or parts of plants such as their stem, leaf or fruit.
- In total, the database contains:
  - 3300+ Transfer-Factor entries
  - 65 different nuclides from
  - 36 different elements;
  - data collected in 23 different countries

## Handbook of Radionuclide Transfer Parameters Soil - Plant for Radioecological Modelling and Emergency Preparedness in Arid Environment

<https://tfe.radcon-nuclear.com/>  
[https://tfe.radcon-nuclear.com/  
Handbook.pdf](https://tfe.radcon-nuclear.com/Handbook.pdf)

## Data Analysis, Collection and Training Courses

- Development of custom software for data analysis and collection from measurements and simulation
- Processing and computation of data
- Using advanced plotting and processing capabilities such as ParaView, VisIt, Cern-ROOT, Matplotlib
- RadCon offers Lectures for the following topics
  - Introduction to radioecology
  - MCNP in general and special MCNP topics such as Variance reduction and radiation shielding
  - Introductory courses into Monte-Carlo traditional transport methods and codes
  - Radioecological modeling: mathematics and application of available software
  - Emergency preparedness and remediation strategies
  - Environmental Decision Support Systems
  - Statistical methods and data analysisAnd more upon request



