

Portuguese Involvement in Radioactive Waste RD&ET Activities

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KADRWaste

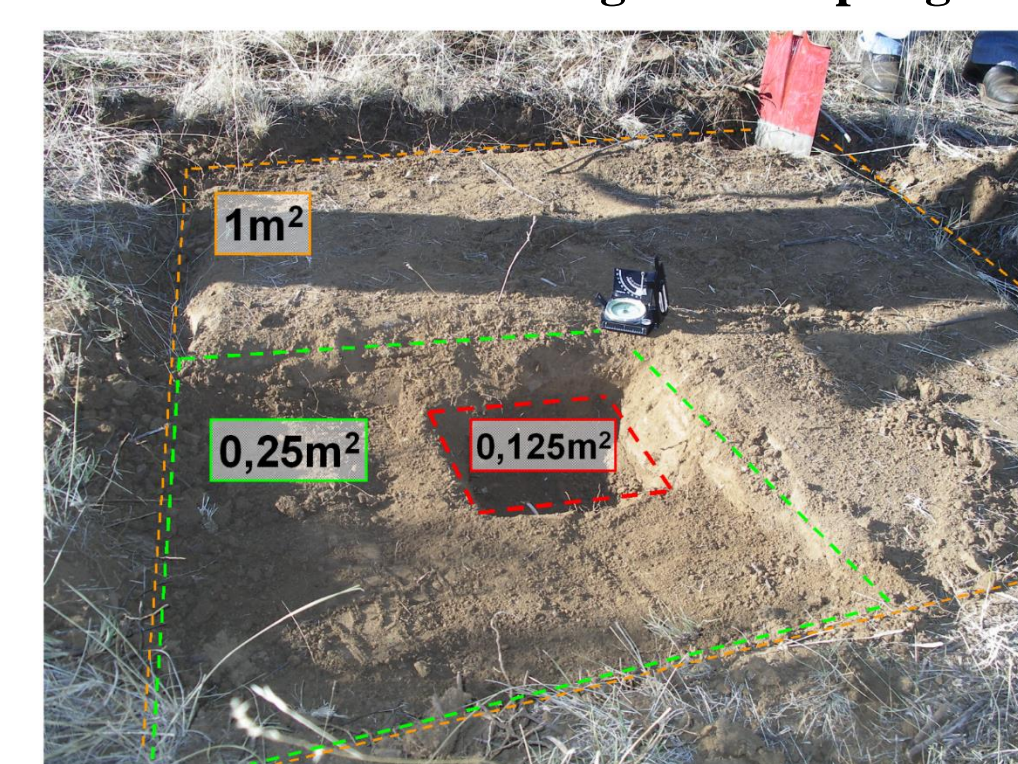
STUDY OF THE ADSORPTION MECHANISMS AND KINETICS IN GEOMATERIALS AND THEIR STRUCTURAL CHARACTERIZATION: IMPLICATIONS FOR PROCESSES OF NATURAL ATTENUATION OF HEAVY METAL CONTAMINATION AND RADIOACTIVE WASTES




Radioactive low and intermediate level wastes (LILW) produced in Portugal arise from radionuclides’ applications in the health, industrial and research sectors as well as from the Portuguese research reactor operations. In compliance with Directive 2011//70/EURATOM and IAEA international recommendations, studies to identify and characterize adequate locals to host a LILW repository have already started:

- To characterize chemically, radiological and geochemically, suitable areas in the Portuguese continental territory, regarding sites with aptness to host a low and intermediate level near surface repository for radwaste
- To identify Portuguese specific natural geomaterials, the clay components of rañas, as potential liners for the disposal site
- To study the mechanisms that control the kinetics of adsorption and desorption of radionuclides onto the selected clay mineral to fix anthropogenic radionuclides (Ex.: ¹³⁷Cs)
- To develop a specific methodology to assess suitable sites to receive a repository for LILW facility in the Portuguese mainland
- Two robust but very sensitive nuclear techniques existing at IST provided reliable data concerning the quantification of stable and radioactive elements in different materials: High Resolution Gamma Spectrometry and Instrumental Neutron Activation Analysis (INAA)

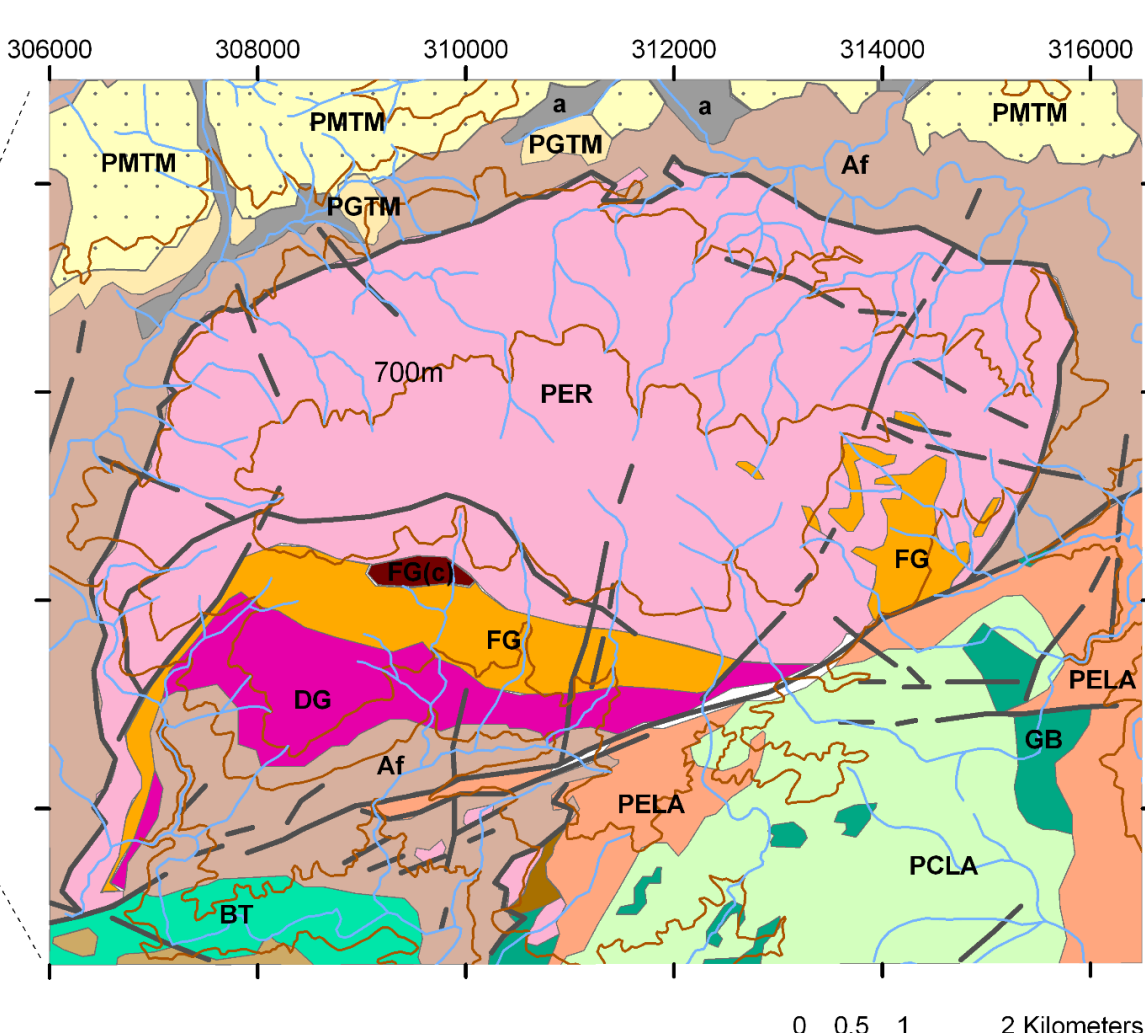
Procedure used in the regolith sampling.



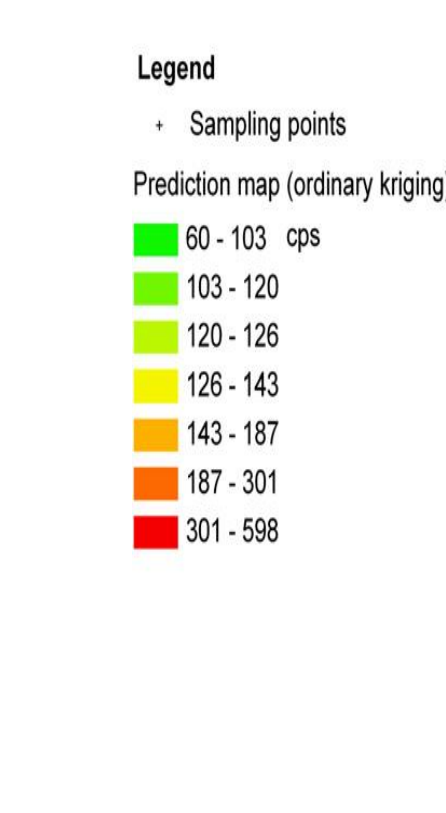
Example of raña sampling site



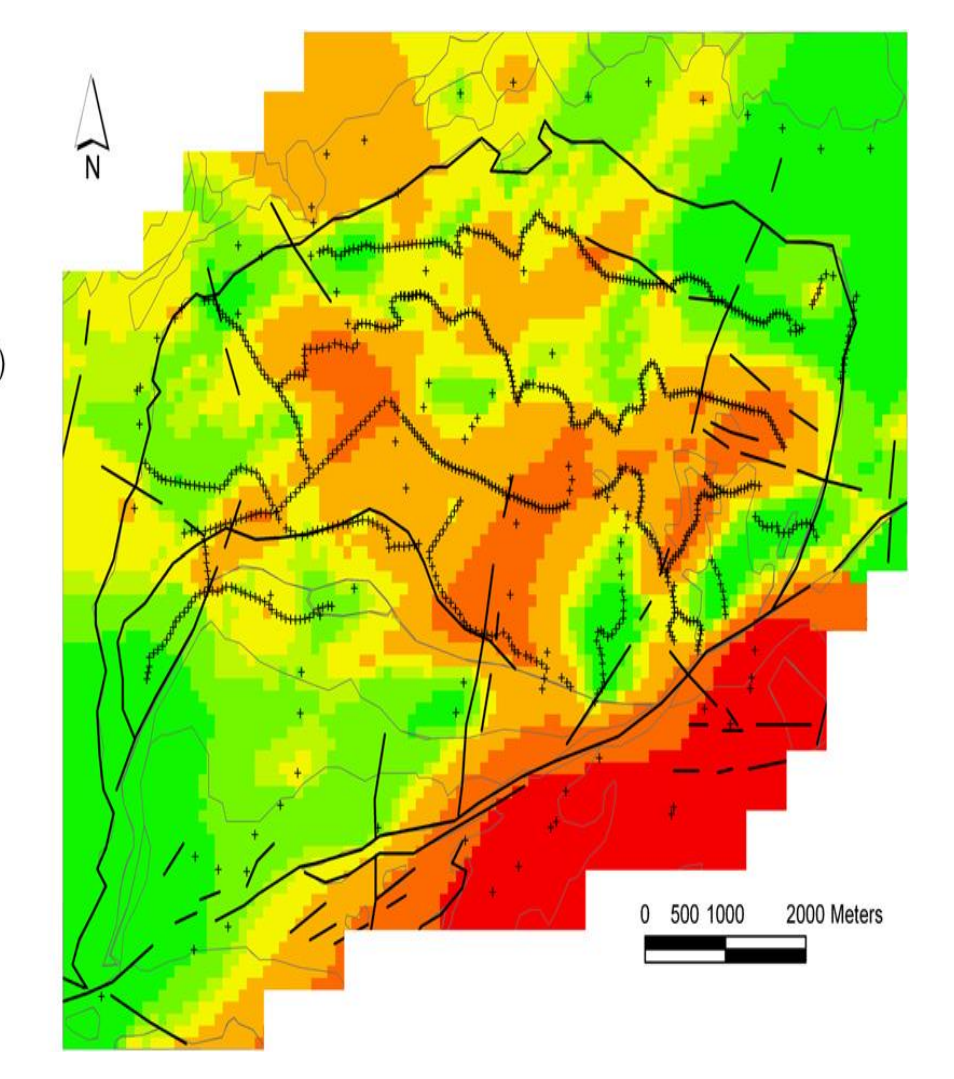
Location of the studied area with overlay geologic map adapted from the Portuguese Geological Maps at 1:200 000 scale (sheet 2)—LNEG, Portugal. Geological legend: PCTM—essentially composed of gravel-rich sediments with carbonate or ferruginous cements; PMTM—mostly comprising gravel-rich sediments with sandy-silt matrix; PER—Deformed (locally strongly foliated) serpentinitised peridotites; FG—retrograded (amphibolitised) flaser-gabbros; FG(c)—retrograded, pyroxene-rich gabbros; DG—“dyke in gabbro” complex; Af—amphibolites. PELA—augen orthogneisses; PCA—Mica-schists and meta-greywackes with intercalated meta-volcanics; BT—quartz-phyllites, meta-greywackes and green-schists with intercalations of (mafic) meta-volcanics.



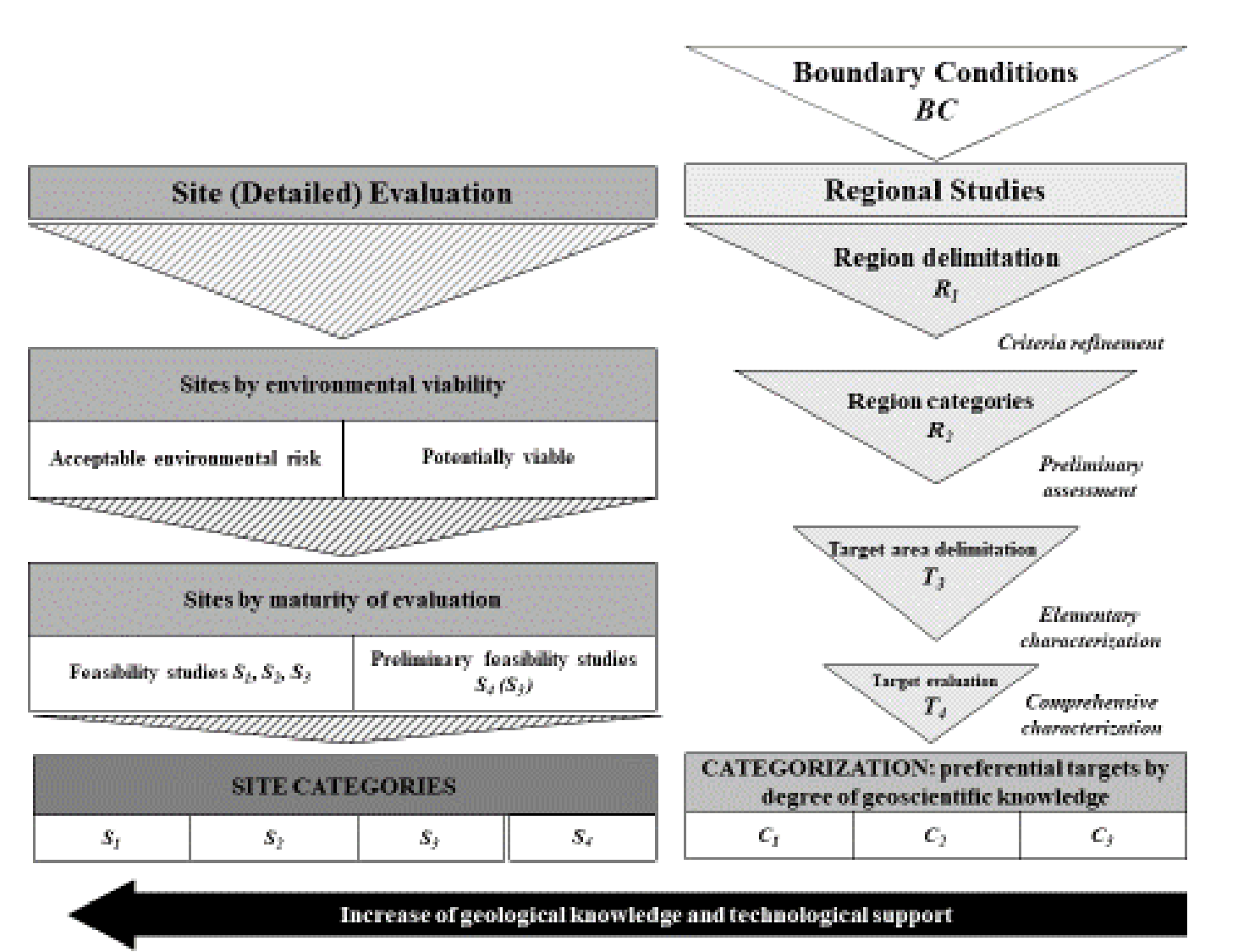
Dendrogram based on the elemental composition and radionuclide content of soil and rañas.



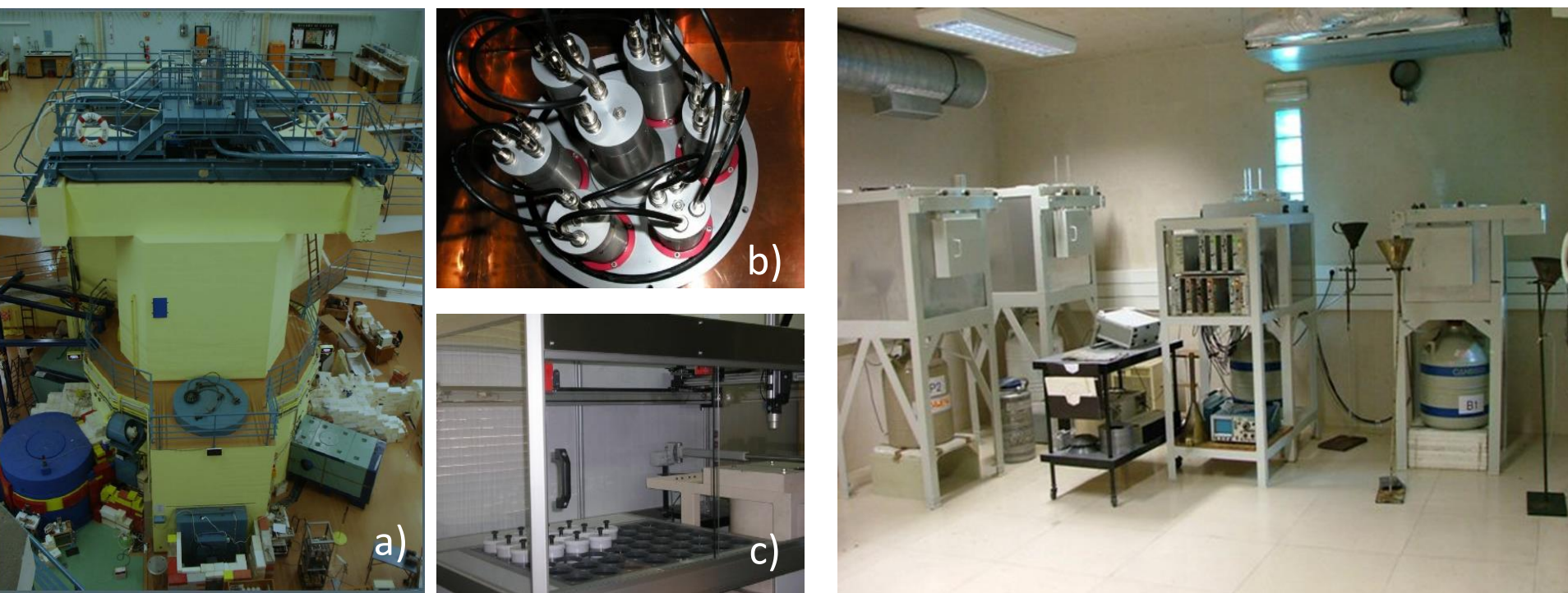
Radiometric map of scenario X. Ordinary kriging (exponential model) after variogram analysis using an anisotropy ratio of 1.56 along ENE–WSW direction.



Development of a specific methodology to assess a possible site to host a near surface repository in Portugal mainland.



Irradiation and measurement facilities for Instrumental Neutron Activation Analysis (INAA) at Portuguese Research Reactor (RPI): a) Front view of RPI; b) Compton suppression system and c) Automatic sample changer





PETRUS III - IMPLEMENTING SUSTAINABLE E&T PROGRAMS IN THE FIELD OF RADIOACTIVE WASTE DISPOSAL

“PETRUS” Initiative coordinates universities, WMOs, training organizations and research institutes efforts to develop cooperative approach to E&T in radwaste management throughout the EU

Practical implementation of PETRUS training program following ECVET principles

Elaboration of multidisciplinary training and research framework for PhD students

Development of strategies and framework for maintaining PETRUS initiative over the long-term

Set-up PhD programs in geological disposal that can be accredited and recognized

Organization of periodic PhD events
Favor the emergence of multidisciplinary research

Collaboration with IGD-TP CMET Group
Establish links with other organizations (IAEA)
Create framework for the integration of the ENEN structure

PETRUS-ANNETTE-ENEN PhD Event in Lisbon, IST



CMET Meeting in Lisbon, IST



Partners: ULorraine, IST, TUDelft, Ucdiff, UPM, Ulinnaeus, École des Mines de Nancy, Uaalto, SK-CEN, ENRESA, CVUT, UPB, Posiva Oy, ANDRA, ARAO, RAWRA/SURAO, CEA, Micans, ENEN

IAEA RER9143 - ENHANCING RADIOACTIVE WASTE MANAGEMENT CAPABILITIES

To foster regional cooperation, knowledge sharing and infrastructure development.
To promote exchanging of professionals and students through regional courses, workshops and labs activities in different IAEA member states

MASTER COURSE ON RADIOLOGICAL PROTECTION AND SAFETY – IST/MPSR

To introduce students from health , industrial and research areas to the radwaste various issues
Curricular Units (CU) – Radioactive Waste & Environmental Radioactivity
Started 2016-2017; 66 hours/ 6 ECTS each CU