Projekt traceRadon

Radon metrology for use in climate change observation and radiation protection at the environmental level

Centralne Laboratorium
Ochrony Radiologicznej

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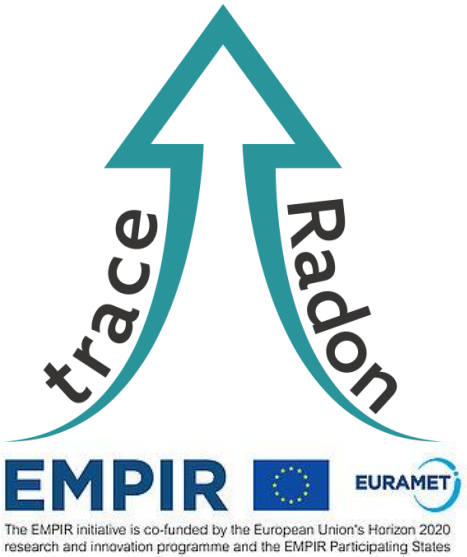


Projekt traceRadon

- początek 01 czerwca 2020 r.
- czas trwania: 3 lata
- Budżet 2 245 357,14 €
- Konsorcjum: 18 instytutów
- Program EMPIR w ramach stowarzyszenia EURAMET
- Koordynator: Annette Röttger PTB
- Strona projektu: www.traceRadon-empir.eu

Uczestnicy projektu

7 Internal Funded Partner

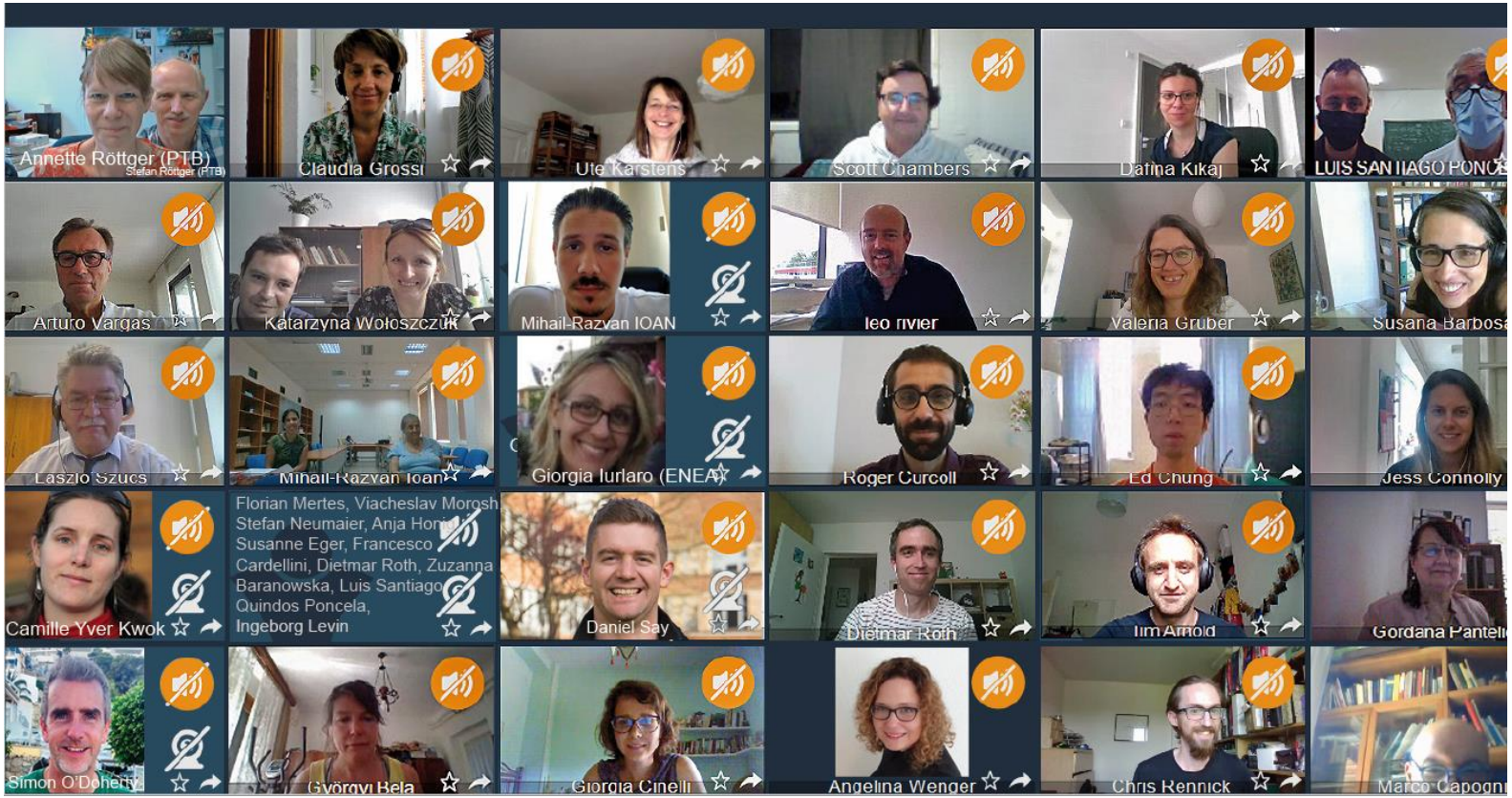
- **PTB (NIEMCY)**
- BFKH (Węgry)
- CMI (Czechy)
- ENEA (Włochy)
- IFIN-HH (Rumunia)
- NPL (Anglia)
- VINS (Serbia)

10 External Funded Partner

- AGES (Austria)
- **CLOR (Polska)**
- INESC TEC (Portugalia)
- JRC (Europa)
- LUND (Szwecja)
- SUJCHBO (Czechy)
- UC (Hiszpania)
- UOB (Anglia)
- UPC (Hiszpania)
- UVSQ (Francja)

1 Unfunded Partner

- IDEAS (Węgry)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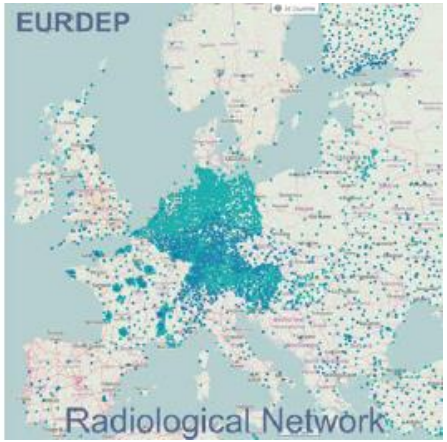
EMPIR 19ENV01 traceRadon

- Zmiana klimatu to jedno z największych wyzwań naszych czasów.
- Wzrost temperatury atmosfery naszej planety spowodowany wzrostem emisji gazów cieplarnianych.
- Monitorowanie emisji gazów cieplarnianych, dyspersji gazów cieplarnianych i wynikających z nich stężeń gazów cieplarnianych w powietrzu ma ogromne znaczenie dla podejmowanych odpowiednich środków łagodzących zmiany klimatu.
- Dane dotyczące strumienia radonu i stężenia radonu są potrzebne do oszacowania regionalnych strumieni emisji gazów cieplarnianych i tzw. radon prone areas (RPA), ale niepewności są zbyt wysokie.

Celem projektu traceRadon jest ustanowienie bazy metrologicznej, która wspiera pomiary radonu na zewnątrz do stosowania w obserwacji klimatu i ochronie przed promieniowaniem dla ludności.

ICOS (Integrated Cabon Observation System)
międzynarodowa sieć pomiarowa, której celem jest umożliwić prowadzenie wysokiej jakości badań nad zmianą klimatu i zwiększenie użyteczności/standaryzacja danych badawczych. Główne zadanie - monitoring GHG



EURDEP (European Radiological Data Exchange Platform)
gromadzenie i wymiana danych z monitoringu radiologicznego między krajami europejskimi.

Obie sieci mogłyby zyskać na pomiarach radonu na zewnątrz „outdoor". Ale nadal brakuje spójności pomiarowej i odniesienia do układu SI.

Cel projektu

Celem tego projektu jest rozwinięcie zdolności metrologicznych poprzez opracowanie przyrządów referencyjnych, przenośnych wzorców referencyjnych i procedur pomiarowych, do pomiaru niskich poziomów stężeń radonu w środowisku, aby móc je wykorzystać w strategiach redukcji emisji gazów cieplarnianych i poprawy ochrony przed promieniowaniem ludności.

Struktura

Podział na pakiety robocze

	Tytuł pakietu roboczego	Partnerzy	miesięcy
WP1	Traceable measurements of outdoor radon activity concentrations	**PTB**, BFKH, CMI, ENEA, IFIN-HH, NPL, CLOR, SUJCHBO, UoB, UPC, UVSQ, IDEAS	86,0
WP2	Radon flux measurements	**UPC**, PTB, BFKH, CMI, ENEA, IFIN-HH, NPL, CLOR, INESC TEC, JRC, LUND, SUJCHBO, UC, UoB, UVSQ, IDEAS	91,6
WP3	Validation of radon flux models and inventories using radon flux and terrestrial data	**LUND,** PTB, ENEA, NPL, AGES, CLOR, INESC TEC, JRC, UoB, UPC, UVSQ	68,6
WP4	Radon and radon flux in maps for radiation protection issues	**JRC**, PTB, VINS, AGES, CLOR, INESC TEC, LUND, UC, UoB, UPC	23,9
WP5	Creating impact	**NPL,** all partners	35,1
WP6	Management and coordination	**PTB,** all partners	34,0
			339,2

WP1

ANSTO 200 L dual-loop two-filter Rn-222 detector

The aim of this work package is to develop traceable methods for the measurement of outdoor low-level radon activity concentrations in the range of 1 Bq m^{-3} to 100 Bq m^{-3} with uncertainties of 10 % (k=1) to be used in climate and radiation protection networks. These methods will include two new traceable Rn-222 emanation sources below 100 Bq m^{-3}, a transfer instrument traceably calibrated with these new sources and a calibration procedure suitable to enable a traceable calibration of environmental atmospheric radon measurement systems in the field.

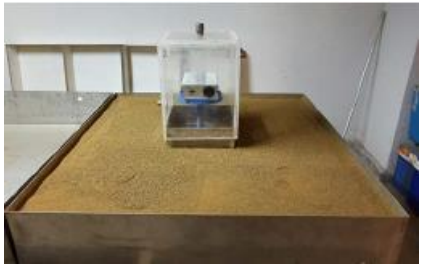
The EMPIR project 16ENV10 MetroRADON developed the capability to measure SI traceable radon activity concentrations, in the range 100 Bq m^{-3} to 300 Bq m^{-3}, for indoor radon measurements. This work package will extend this metrology capability to outdoor low-level radon activity concentrations in the range 1 Bq m^{-3} to 100 Bq m^{-3}.

WP1

Specifically, the Task aims are:

- Task 1.1. to develop two new traceable, low level Rn-222 emanating sources (below 100 Bq m^{-3}).
- Task 1.2. to develop a transfer standard for the traceable calibration of atmospheric radon monitors according to IEC 61577, at atmospheric radon levels (below 100 Bq m^{-3})
- Task 1.3. to use the Rn-222 emanating sources from Task 1.1 and the transfer standard from Task 1.2, to enable the traceable calibration of environmental atmospheric radon measurement systems in the field, with an hourly uncertainty below 15 % for k=1.

WP2



The aim of this work package is to develop the capability for traceable radon flux measurements in the field, based on the development of a radon exhalation reference system "exhalation bed" and a transfer standard. Then to use this capability to harmonise existing radon flux instruments/methods using intercomparisons.

In addition, an intense radon flux campaign will be carried out to provide data for WP3 and for the identification of RPA in WP4. Finally, a first general protocol for the application of the RTM to enable retrieval of GHG fluxes at atmospheric climate gas monitoring stations will be developed.

ANSTO autoflux system for automatic radon flux measurements (top)
The UC designed exhalation bed with an accumulation chamber and radon monitor shown for scale (bottom)

WP2

Specifically, the Task aims are:

- Task 2.1. to develop a continuous radon flux monitor for use as a transfer standard to calibrate existing radon flux monitors under laboratory conditions. Furthermore, to develop a radon exhalation reference system “exhalation bed”, (as the starting point of the traceability chain to the SI) and use this to calibrate the continuous radon flux monitor with an hourly uncertainty of 10 % for k=1.
- Task 2.2. to use the radon flux monitoring capability developed in Task 2.1 and to harmonise existing radon flux methods and monitors under field conditions using intercomparison campaigns.
- Task 2.3. to perform intense radon flux measurement campaigns in the field at AMNS or RMS using the calibrated continuous radon flux monitors from Tasks 2.1 and 2.2.
- Task 2.4. to develop a protocol for the application of the RTM to enable future retrievals of GHG fluxes at atmospheric climate gas monitoring stations and to use radon flux data for the identification of RPA.

WP3

The aims of this work package are to validate current radon flux models and inventories using traceable measurements of radon flux and radon activity concentration supported by dosimetric and spectrometric data from the radiological early warning networks in Europe. In addition, to improve process-based radon flux maps that can be used in the RTM, atmospheric dispersion modelling, and radiation protection.

WP3

Specifically, the Task aims are:

- Task 3.1. To update the process-based radon flux map for geographical Europe (available at the ICOS Carbon Portal via partner LUND) to cover more recent time periods and to increase the temporal resolution from monthly to daily fluxes.
- Task 3.2. To evaluate the dosimetric and spectrometric data from radiological early warning networks in Europe (collected by partner JRC) to further improve current radon flux models and inventories and validate process-based radon flux maps.
- Task 3.3. To use the radon flux and soil moisture data from the measurement campaigns in Task 2.3 to evaluate process-based radon flux maps and validate radon flux models and inventories.
- Task 3.4. To further validate current process-based radon flux maps and inventories using the radon activity concentration data from Task 1.2 together with ATM to relate atmospheric radon activity concentrations with radon fluxes.

WP4

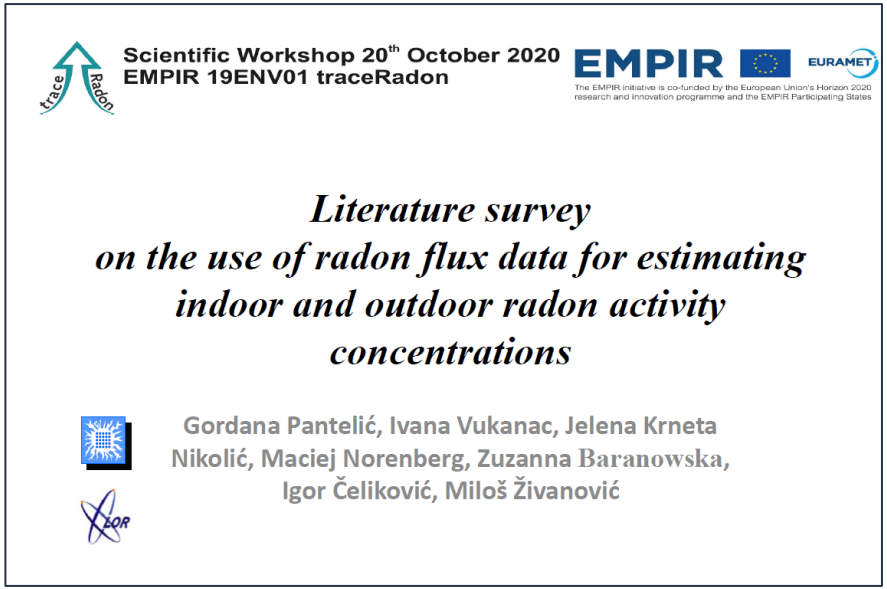
The aim of this work package is to provide an easy to use dynamic radon concentration and radon flux map for climate change research and radiation protection in line with Council Directive 2013/59/EURATOM, including their use to identify RPA and radon wash-out peaks

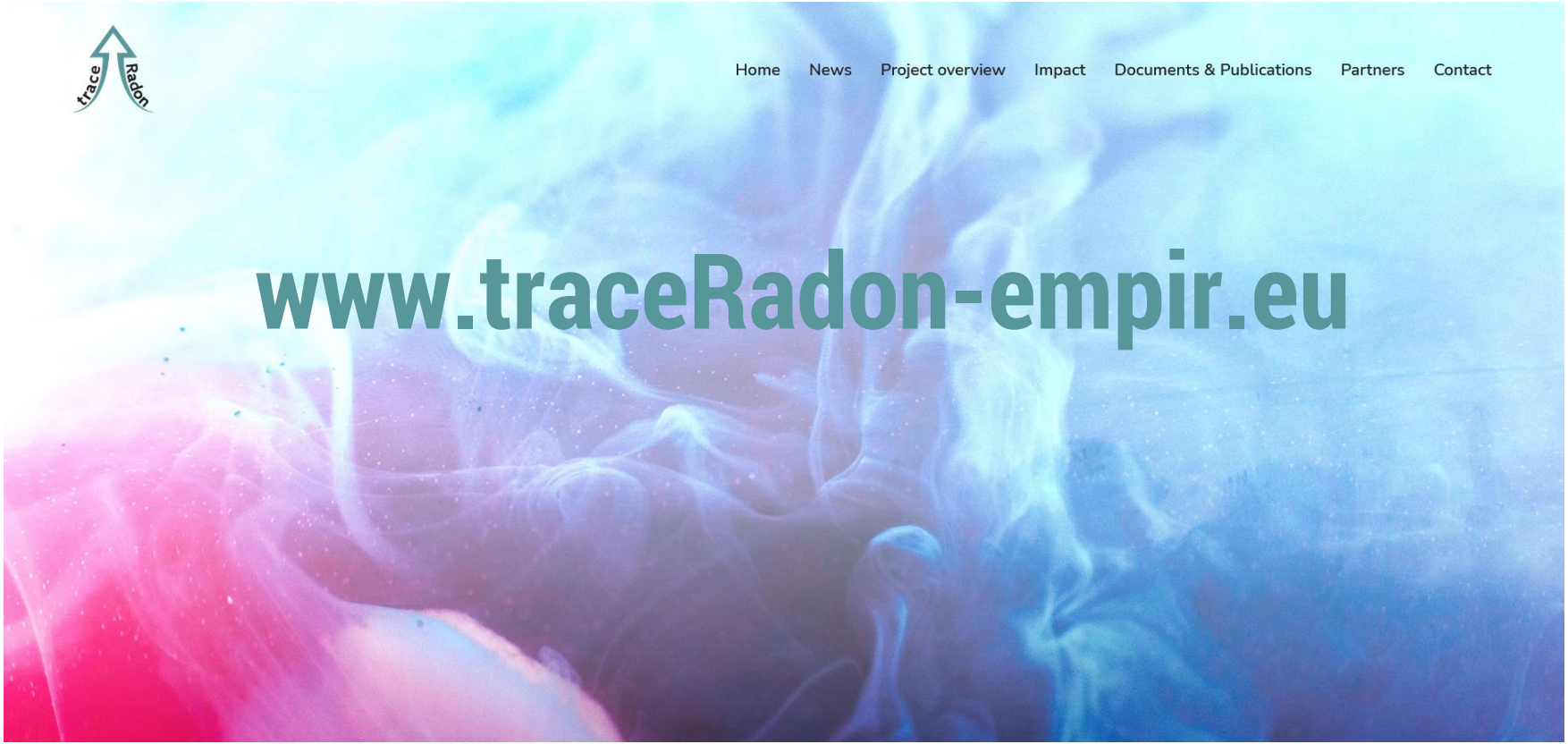
Specifically, the Task aims are:

- Task 4.1. To develop improved methods for the identification of RPA using outdoor radon activity concentration data, radon flux data and radon flux maps.
- Task 4.2. To develop improved methods for estimating radon wash-out peaks from total gamma dose rate data in the EURDEP early warning system. This will be done in order to better understand radon wash-out peaks and to try to prevent false alarms in the EURDEP system due to radon washout effects.
- Task 4.3. To provide online easily usable dynamic radon activity concentration and radon flux maps for climate change research and radiation protection in line with Council Directive 2013/59/EURATOM.

Deliverables

Prezentacje

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