Roinn Cumarsáide, Gníomhaithe
ar son na hAeráide & Comhshaoil
Department of Communications,
Climate Action & Environment

Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann

Radon Hazard

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Tellus

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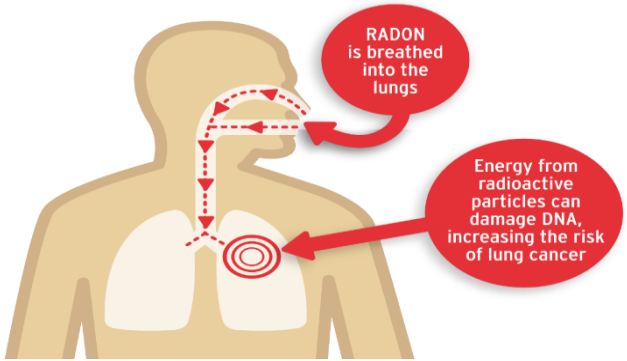
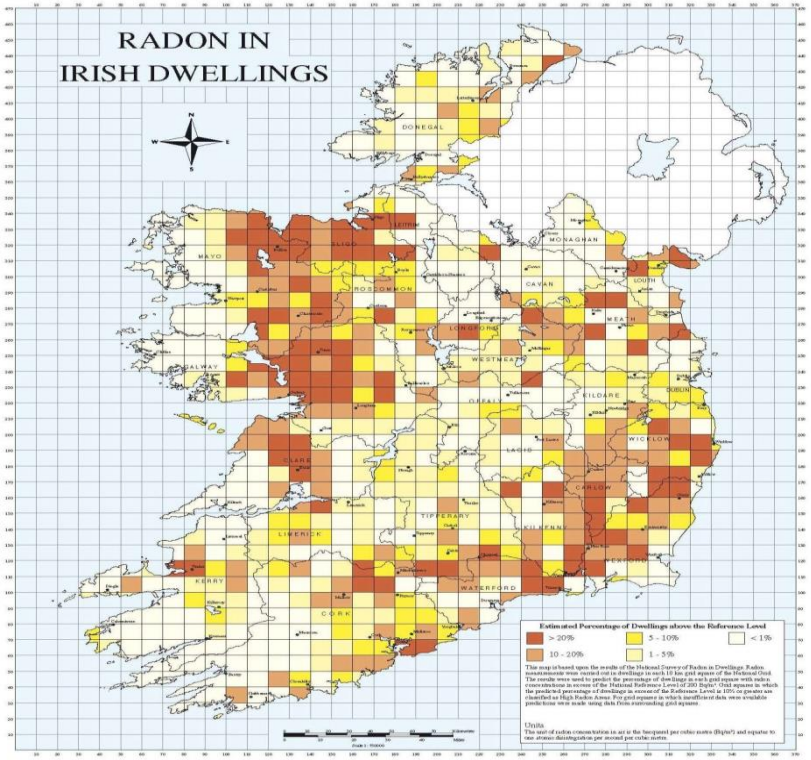
Radon – a hazard in Ireland



1. Radon is a known carcinogen
2. 86% of all radiation exposure is from natural sources – 55% of all exposure comes from radon
3. This radiation can interact with lung tissue leading to DNA damage and development of lung cancer – the effect is magnified if you are a smoker
4. Up to 250 lung cancer deaths can be linked to radon each year

High levels in Ireland



Existing radon map based on indoor measurements created by EPA at 10km grid scale.

Radon levels vary across the country

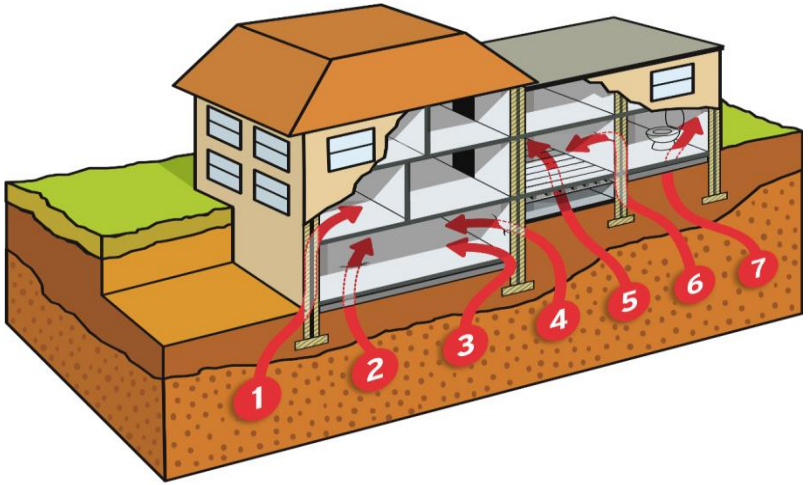
Max: 49,000 Bq/m^3

Mean: 89 Bq/m^3

Some of the highest levels in Europe – 8th highest among 29 OECD countries

Estimated that >7% of dwelling over Reference level of 200 Bq/m^3

Mapping radon highs



How radon can enter the home

Accurate mapping of radon highs is important.

- to target homeowners so remediation work can be carried out.
- As it directly affects building regulations which require that all new homes in high radon areas (> 200 Bq/m^3) are installed with a radon barrier

>> Radon is a hazard that can be mitigated <<

National Radon Control Strategy

'Radon is the greatest source of radiation exposure to the public. However, a range of cost effective measures exist both to prevent the problem in new buildings and to remediate existing buildings. It is therefore an area where significant public health gains can be achieved through suitable policy interventions. '

Strategy recommends a broad range of measures aimed at reducing the risk from radon to people living in Ireland. Including;

- Use of property transactions (sales and rental) to drive action on radon;
- Raising radon awareness and encouraging individual action on radon;
- Advice and guidance for individual householders and employers with high radon results;
- Promoting confidence in radon services; and
- Addressing radon in workplaces and public buildings.

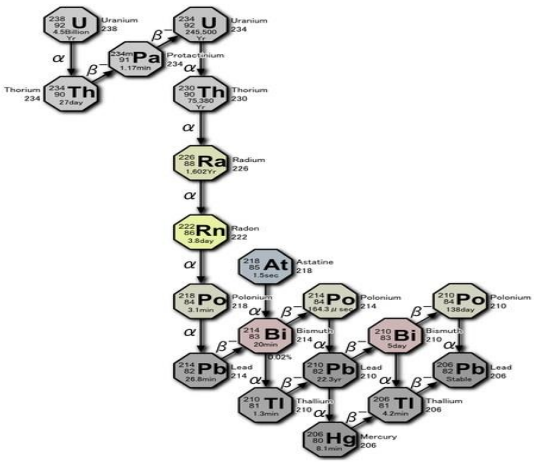
Geological Survey, member of interagency group established to develop **NRCS*

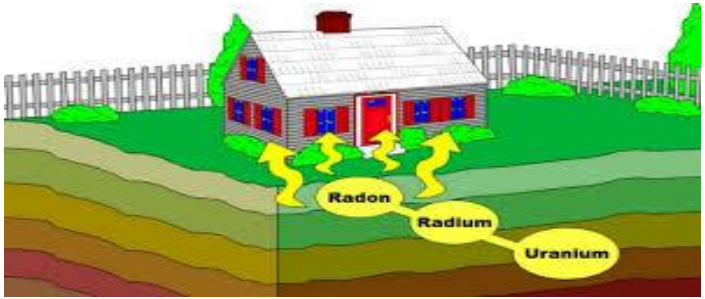
A geological issue!

Radon is a daughter product of Uranium ^{238}

The uranium content of the rocks and soil will determine the source potential of radon.

Using geological information can improve our understanding of the distribution of radon.

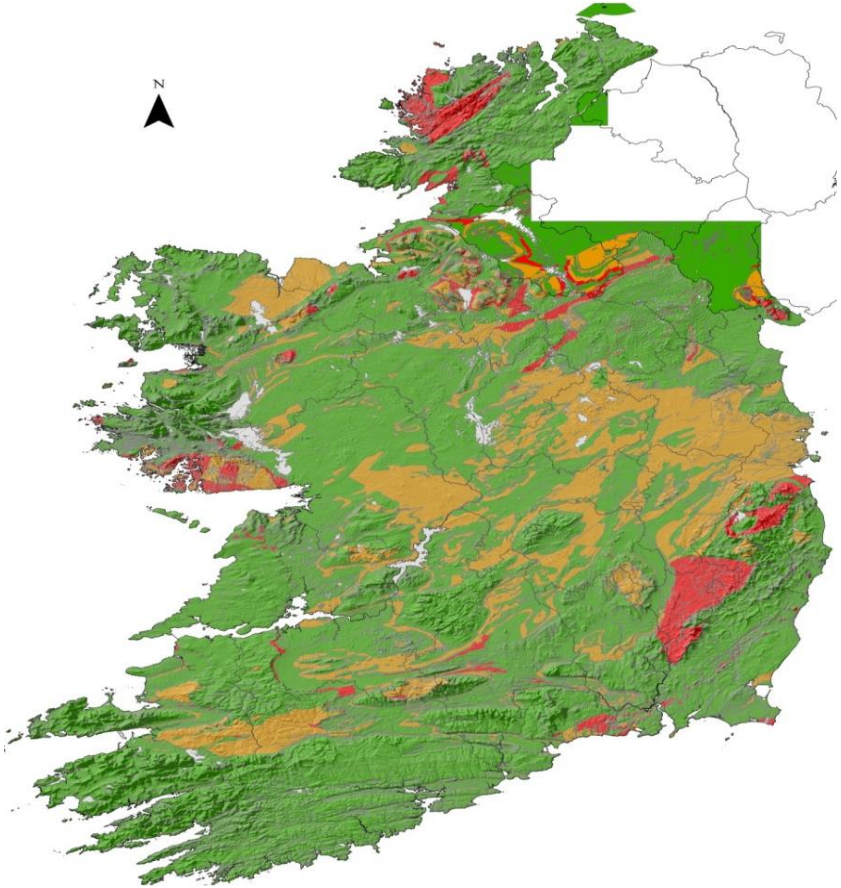




Available Datasets

- Tellus airborne geophysics – U, Th, K etc
- Tellus geochemistry
- Bedrock maps
- Soil maps - permeability
- Groundwater maps

Uranium – radon source areas



Use

- Bedrock type – granites / shales etc
- Airborne eU
- Geochemistry – rock/soil samples
- Soil Gas measurements

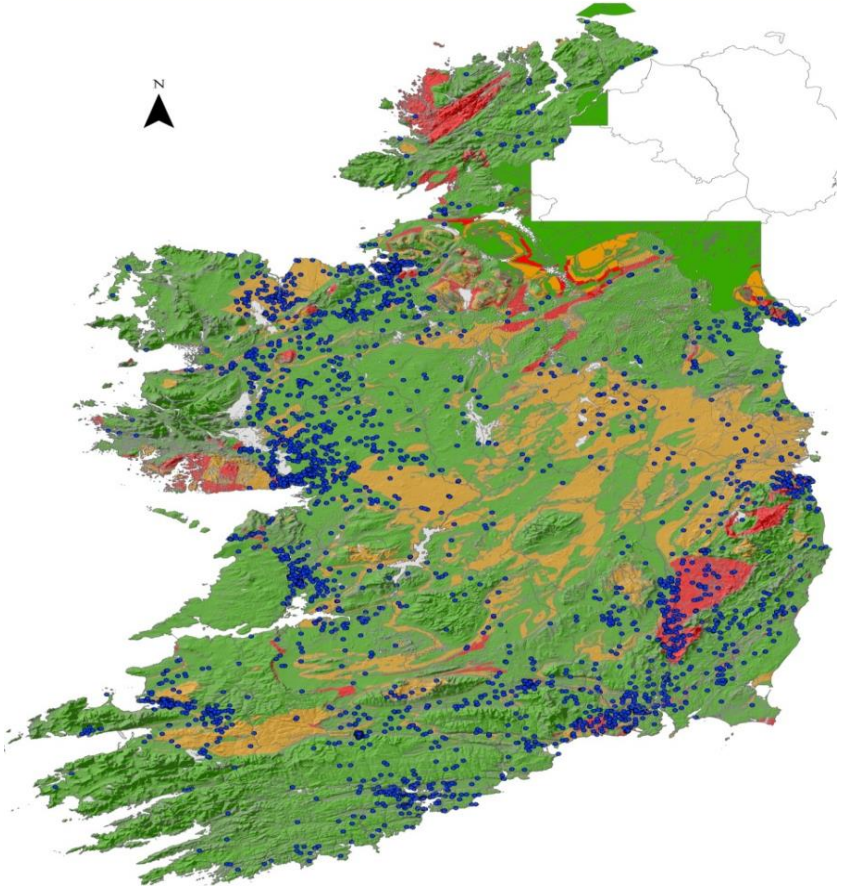
Uranium Source - High

Medium

Low

Important to understand sources of Radon.

In-door radon and source rocks



Use

- Bedrock type – granites / shales
- Airborne eU
- Geochemistry – rock/soil samples
- Soil Gas measurements

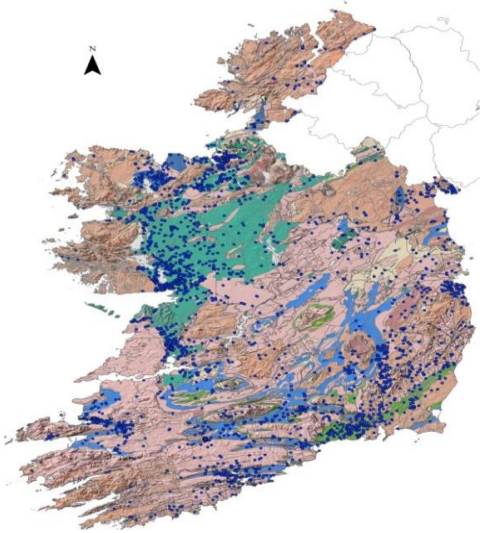
Uranium Source - High

Medium

Low

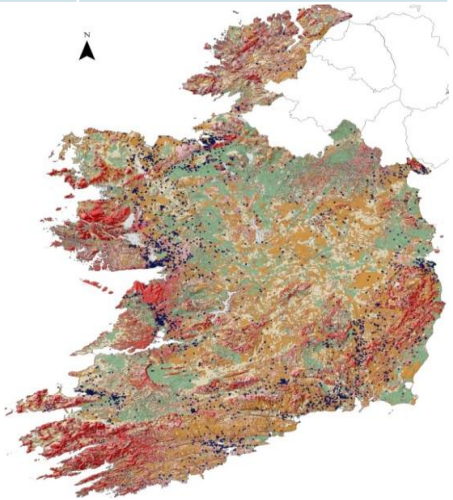
Uranium Source Type	% of Radon Points above 200 Bq/m³
High	15 %
Medium	14 %
Low	71 %

Role of pathways



Aquifer Type	% of Radon Points above 200 Bq/m³
Regionally Important Bedrock Aquifer	54 %
Locally Important Bedrock Aquifer	26 %
Poor Bedrock Aquifer	20 %

Vulnerability Type	% of Radon Points above 200 Bq/m³
High/Extreme	71 %
Medium	12 %
Low	4 %
Bedrock at/near surface or karst	13 %



Geological investigations

Important to map both the source and pathway to understand the true distribution of radon.

SOURCE
Rocks

→

PATHWAY
Fractures.
Groundwater
Soil

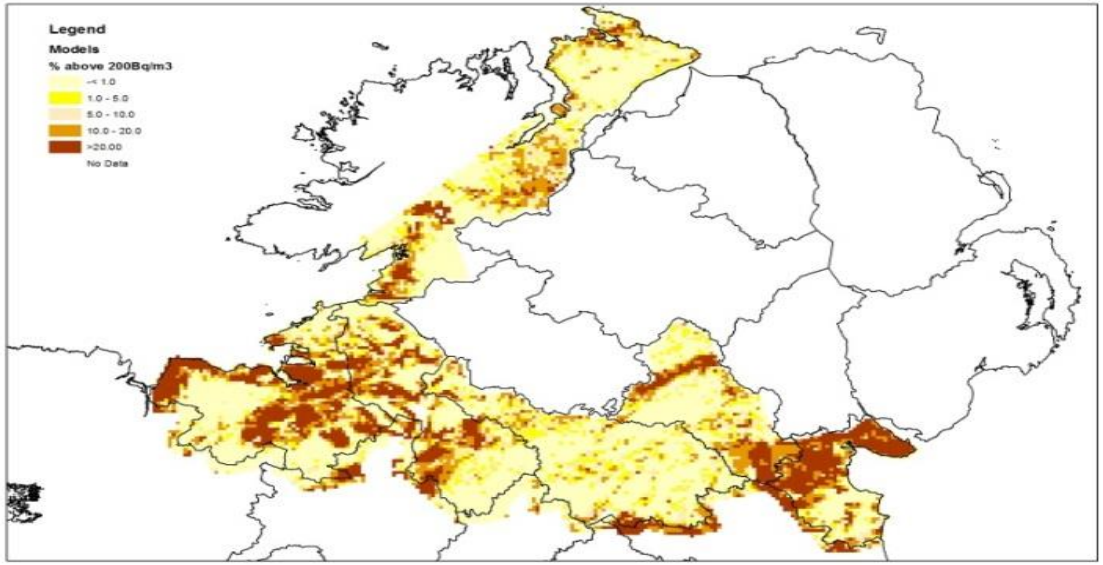
→

RECEPTOR
Dwelling

Earlier work by GSI looking at the geological factors that influence radon occurrences in karstic regions – O'Conner *et al.,* 1993

ASSESSMENT OF THE GEOLOGICAL FACTORS INFLUENCING THE OCCURRENCE OF RADON HAZARD AREAS IN A KARSTIC REGION

GSI research & radon risk models

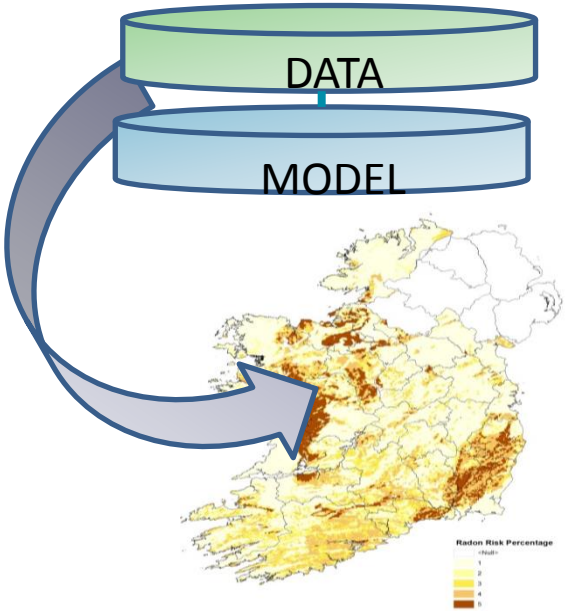


Radon risk - modelling airborne uranium data and geological parameters. (Hodgson & Carey 2013)

GSI research & radon risk models

Radon risk modelling extremely complex with many factors influencing radon levels in peoples homes including;

- Local geology
- Soil permeability
- Groundwater flow and interactions
- Building type
- Weather
- Ventilation



Separate models?

Geogenic (source & pathway)

Receptor (dwelling)

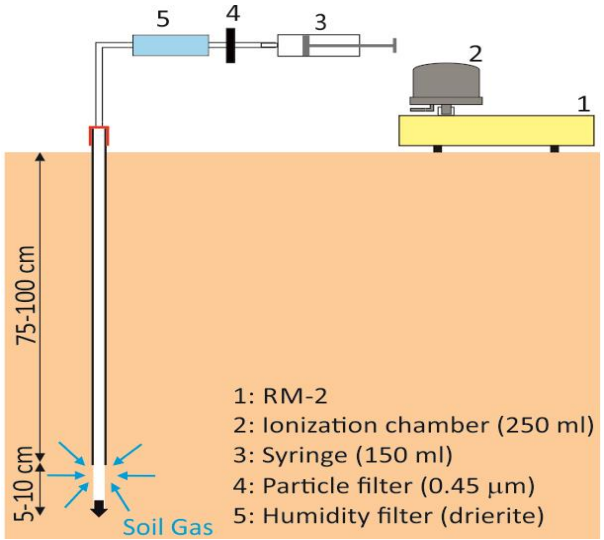
<u>Aim</u>

To develop a geogenic radon risk model using existing datasets (& new data) which can be used nationwide.

New GSI supported research

GSI co-funder of Enterprise Partnership Scheme with IRC (2016-2017)

Dr. Javier Elío, Trinity College Dublin – Radon monitoring and hazard prediction in Ireland



Analysis of existing data – soil gas measurements – development of radon potential model

→ Can this be applied on a national scale

Final thoughts

- Radon is a significant hazard in Ireland associated with approx. 250 deaths per year
- National Radon Control Strategy has been developed (GSI is a member)
- Accurate mapping of radon is important to identify radon risk areas but also has impact on building regulations
- Geological understanding essential for any radon risk mapping
- GSI has many existing datasets and plans for further data collection (Tellus) which will be of benefit to mapping radon.
- Radon mapping is complex with many variables
- GSI has undertaken own work and continues to support current and future research in to radon risk in Ireland.

Thank You

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