IGCP Project 571

Radon, Health and Natural Hazards.

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The First Year

The first meeting of the Project was held in April 2009 at the EGU General Assembly in Vienna, where 24 abstracts were submitted to three sessions 'Radon, Health and Natural Hazards' (NH9.5). There were authors from 12 countries (France, UK, Poland, Iran, Portugal, Greece, Cyprus, Slovenia, India, Hungary, Austria, Taiwan) and other attendees from these and several other countries, including other EU countries and Turkey, Norway, USA.

Communication has been established between groups in the UK, France, Poland, India and Taiwan. A number of additional participants have joined the project recently or asked to – for example, participants from Ghana, the Czech Republic, Greece, Trinidad & Tobago, Spain, Japan and Canada.

Project Outline: Health

This project focuses on a variety of impacts and hazard-associated manifestations of radon gas. This colourless, odourless, radioactive gas together with its radioactive daughter isotopes has been linked to lung cancer (and other cancers). In the UK it has been suggested by government bodies (e.g. HPA) that between 1000 and 2000 people die each year from radon induced lung cancer.

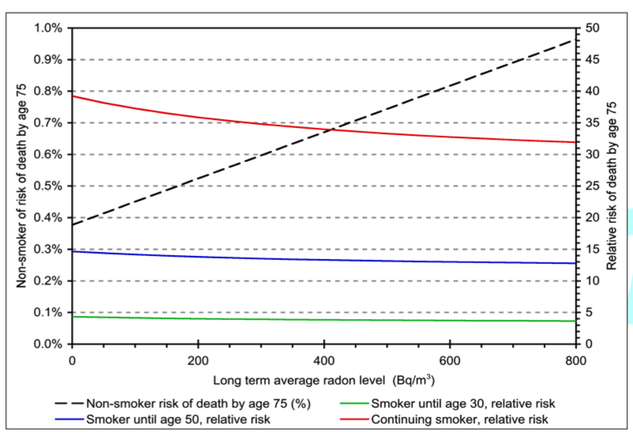

Fig 1. Acceleration of smoking-related risk of death from lung cancer with indoor radon level. Data re-presented from Gray *et al.* (2009).

This is not simply a UK problem: for example, the corresponding figure for the USA is 15000-22000. Recent European-wide research has demonstrated that there is no 'safe' lower limit for radon exposure, which throws into question limits set in the UK (200 Bq/m^3, domestic; 400 Bq/m^3, workplace) and corresponding limits set elsewhere in Europe and the USA, for example, in the home or workplace or in drinking water before remediation is required. Raised radon levels have been noted in work environments (in particular water treatment plants, tunnels, caves and mines) throughout the world and links have been made between radon levels in mines and the incidence of lung cancer in mine workers, for example.

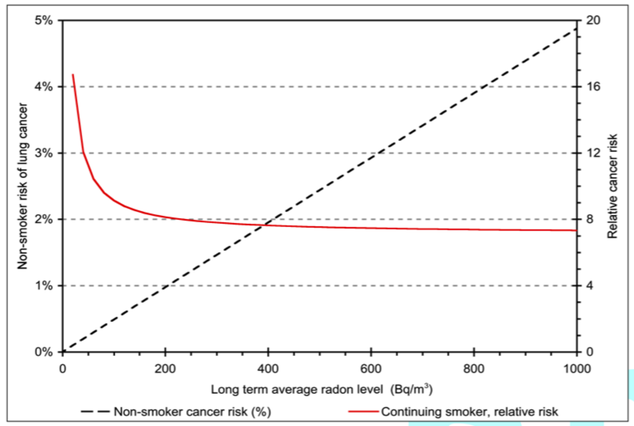

Fig 2. Acceleration of smoking-related risk of lung cancer with indoor radon level. Data re-presented from US EPA (2010).

Project Outline: Geohazards

Other recent research has clearly demonstrated a link between ocean and earth tides and indoor radon levels in some locations. This work is a step towards understanding the drivers behind indoor atmospheric radon levels, but much is still unknown. Similarly, radon is being increasingly used in the monitoring of earthquake activity: a good example is the North Anatolian Fault monitoring network recently established in Turkey but there are networks being planned/established in Nepal and Tibet. Radon in groundwater wells has been used to monitor such activity in Japan and Iran (the latter currently unpublished work).

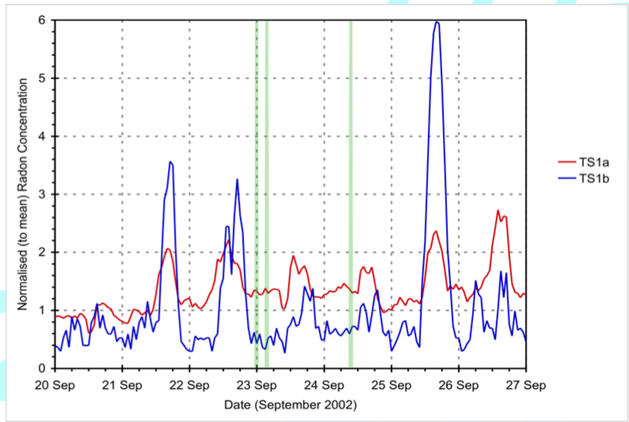

Fig 3. Simultaneous radon anomalies associated with the Dudley earthquakes (green lines) of September 2002. (Crockett *et al.*, 2006)

This hazard has significant socio-economic impact in the developed world and in the developing world, in terms of both indoor radon and radon-associated hazards such as earthquake activity. Short-term and long-term benefits of the programme would be to better inform decision makers as to where and when to employ resources to minimise societal risk – both directly from radon gas and its radioactive daughter isotopes and indirectly from radon-sensitive hazards.

Understanding the behaviour and drivers of radon gas will greatly help hazard planners – both concerning radon itself and using it as an earthquake / landslide / volcanic hazard monitor and precursor.

Objectives for the Second Year

The second year opens with oral, poster and splinter sessions at the 2010 EGU General Assembly and also, a short course on time-series analysis for geoscientists, including radon scientists, with a focus on natural hazards.

A special issue of NHESS, comprising papers from the 2009 EGU General Assembly sessions, will be published.

The websites will continue to be developed, and abstracts from the 2010 EGU GA will be linked. It is intended to secure another special issue for 2010 EGU GA papers from a selection of these abstracts.

Other objectives include:

- discussion board for sharing information
- progression of plenary volume for publishing
- set-up and co-ordination of video-conference facilities
- establish local working groups to consider appropriate local/regional strategies
- further EGU / other conference sessions

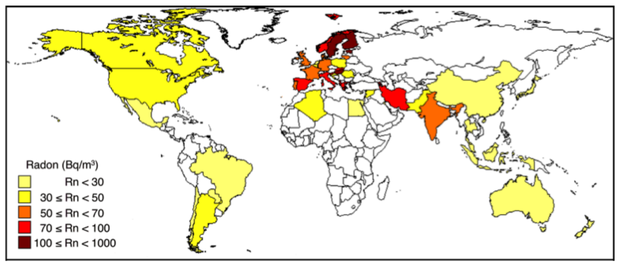

Fig 4. Global nature of indoor radon hazard. Adapted from: Steck, Minnesota Radon Project.

The Project Team

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References

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