



## High Radon concentration in the karst area of south Puglia, Italy

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The Radon mapping are normally based on regular grids or on geological maps. The geological maps are advantageous because foresee little areas with high hazard in zones which are otherwise considered like a low risk.

The Italian national maps consider the South Puglia, Lecce Karst, as a zone with low risk, but this region presents local important anomalies that can be seen with the geological Radon map.

The methodology used to understand the natural phenomena (that are the basis of the analysis of potential Radon risk) is based on a preliminary study from literature:

- Geological study, general classification, environment formation in which it has developed the area or part of it, detailed studies of the area investigated, the underground structure, level of fracturing, cracking, and primary and secondary porosity, seismic of area.
- The Area's identification with different risk degrees of Radon production, concentration and emanation characterized by natural boundaries, geological, geomorphological, etc...

Information obtained from paragraphs 1 and 2 provide the "Indices of potential risk of the generation, emanation and diffusion of Radon"; this hazard indices allow to optimize the measurements distribution in soils. We identify the sub-areas of the zone study that can be characterized by high Radon concentrations, dividing these by "natural" hypothetical lines such as the lithology changing, permeability, subsoil structure, etc. ... The preliminary study allows the optimisation of sampling strategy based on not Uniform distribution of "in situ" measures, where to intensify the measures and where to make only control points of Radon concentration.

With these information and with Uranium concentration in samples of different geological formations and Radon measures in water and in soil air we obtained thematic maps and box-plots linking the natural geological indices and we identified the factors that govern the Radon rise and diffusion.

The Lecce Karst's study have foreseen:

- Samples of rocks and soils to determine the Uranium concentration;
- Collection of water samples for the determination of Radon concentrations;
- Measurements of the Radon concentration in soil air;

The Lecce's area is divided into 4 sub-areas, each of them with the same geological features: subsoil structure with high/normal/low fracturing, cracking, permeability, porosity, ecc. ...

The potential Radon risk increases with the alteration's degree of subsoil structure. Results show that the 4 Lecce's subareas are characterized by average Radon value between 1.000-2.000 Bq/m<sup>3</sup>, and that in 2 of the 4 zones, characterized by high fracturing and big permeability, the range is high, from 400 Bq/m<sup>3</sup> to over the 60.000 Bq/m<sup>3</sup>.

The distribution of anomalies isn't homogeneous in the study zone, but as Hot-Spot and these are present in all sub-areas; the greatest number is detected in areas with high fracturing and cracking and in areas with lithological changes at different permeability.

The others determinants factors in these areas are those anthropogenic; in some little zones belonging to subareas there are industrial and commercial areas built removing soil and damaging and altering the subsoil structure; in this way create zones of Radon accumulation in the soil air with fast ascent of the gas to the surface, and this produce high Radon concentration indoor. In the soil around these areas, few meters from buildings, and in the indoor air the Radon concentration is higher than 60.000 Bq/m<sup>3</sup>.