Radon concentration Monitoring from soil, near seismogenetic faults in some areas of Provincia di Ragusa, related to seismic events and to "indoor"accumulation fenomena

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As known, the oriental part of Sicily is a classified as a high seismological risk level area, where several seismological events, sometimes of high intensity, have marked the territory (among others, the earthquakes occurred in 1693, 1928 and in 1990).

Since the end of 1990 l'Assessorato Territorio, Ambiente e Protezione Civile della Provincia Regionale di Ragusa, through "Settore Geologia e Geognostica", has started a critical study program based on seismological futures of "iblea territory", with the goal to characterize seismogenetic of Iblei Mountains and, overall to outline seismogenetic structures including studies of territory modality answers to an eventual earthquake. This program has created seismometric telemonitoring network, set up at the beginning with four remote stations, positioned in Ragusa, Giarratana, Santa Croce Camerina e Ispica (Figure 1), and with a mobile station; the network has been improved with a new station, located in Acate, and with other 3 mobile stations, allowing a very high flexibility.

All the remote stations are connected to acquisition and working Centre in Ragusa, through phone lines; three mobile stations, beyond a data buffering system, are connected by a GSM modem.

Since many years the scientific community is looking for an evident correlation between seismogenetic faults and Radon in atmosphere introduction coming from soil. Although several research projects have demonstrated direct correlation between Radon increasing concentration in the soil and seismic events (earthquake) close to the area where the radon has increased, these results are still far to be reproduced on large scale where high level earthquake appeared .

During many investigations done by this Department, finalized to micro and macro seismic evaluation in high level interest areas, has been found presence of Uranium with high level concentration related to the expectation. These percentages have been found in some carbonatic areas present in some particular zones of ibleic plateau. Therefore the area Provincia Ragusa can be considered to have a potential Radon risk and this makes the territory a big open sky laboratory.

Intense cooperation with C.U.T.G.A.N.A. (Centro Universitario per la Tutela degli Ambienti Naturali e Agrosistemi), already developed with a big project for scientific Management of Seismometric Monitoring Network of Provincia di Ragusa, and availability of Assessorato Territorio, Ambiente e Protezione Civile of Provincia Regionale Ragusa to invest further funds for territory studies, have pushed to set up a Radon soil concentration monitoring Network to correlate with the existing one of seismometric evaluation. Actually there is a new cooperation with C.U.T.G.A.N.A. to coordinate and make studies for seismological correlation with Radon evaluation, to allow an immediate and practical application to protect the territory and quantify the correlated risk,

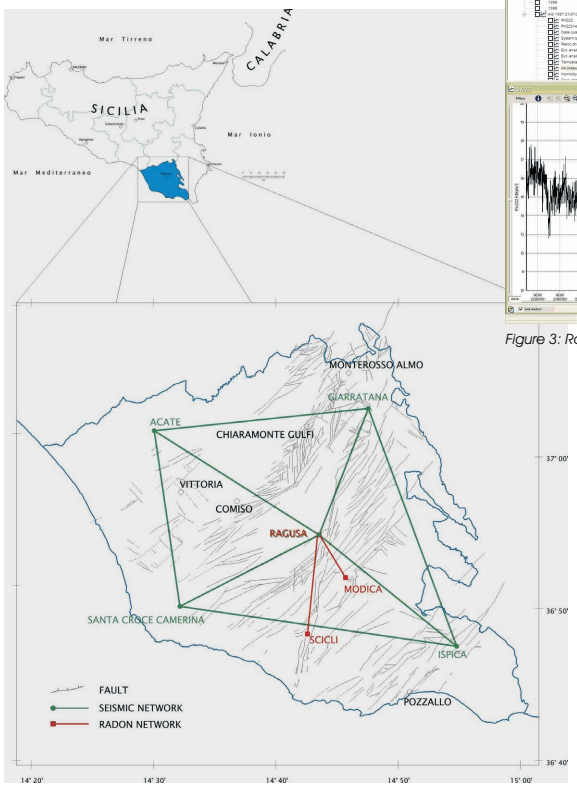

Figure 1: Radon Evaluation Monitoring Network of Provincia Ragusa

Belonging to the activity of technical and administration of Ente Provincia. The objects will have in each case not negligible scientific value, that put the Councellorship of the territory surrounding Ragusa and Civil Protection of the Regional Authority Province of Ragusa in a leadership position. The Radon Evaluation Monitoring Network of Provincia Ragusa is actually set up with three stations, located in Ragusa, Modica and Sicily (Figure 1).

Figure 2: Monitoring station for radon in soil gas suited with with GSM data Transmission in Modica

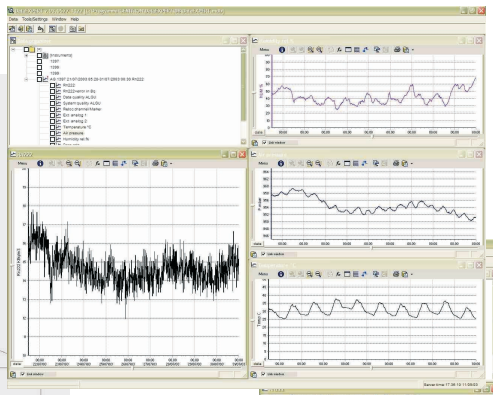

Figure 3: Ragusa station

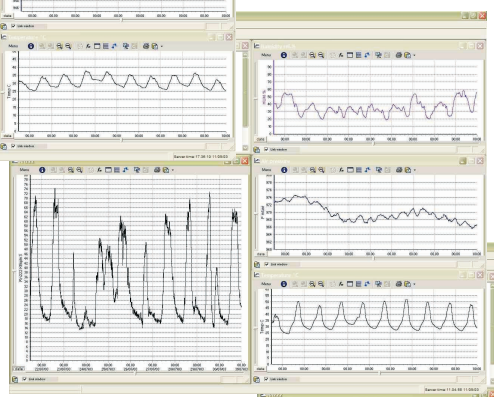

Figure 4: Modica station

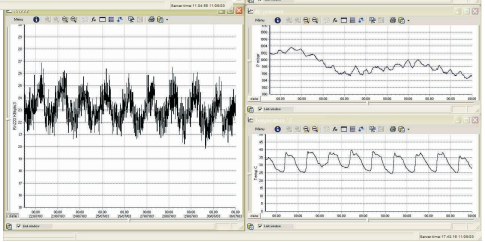

Figure 5: Scicli station

Each monitoring station is located in a suitable protection cabinet linked to the ground with a concrete base plate including a hole and set up of the following equipment:

- One soil probe with telescopic handle, one meter in the earth
- One pump for sucking gas *AlphaPUMP - GENITRON GmbH;*
- One radon monitor *AlphaGUARD PQ2000PRO - GENITRON GmbH;*
- One web server *DataGATE - GENITRON GmbH;*
- One modem GSM for data transmission;
- Additional sensors for external temperature atmospheric pressure, humidity and wind speed.

This installation allows to have a remote monitoring station, stable and flexible, since could be moved in another site easily (Figure 2).

The three sites chosen for installation have been selected for several factors: first of all for the acknowledgement of geological and structural earth morphology, for the results of data coming from the other Monitoring seismological network system, for the evidences found on the presences of Uranium concentration in the soil. These factors have brought interesting prospects for future Radon investigation.

Figure 1shows the location of components of the network and all the network for seismic and radon evaluation.

The goals of such activity are therefore:

- analysis of potential Radon exhalation from soil (PERS) through the data taken from three fixed and one mobile monitoring station compared to geological morphology have been studied. Therefore it is possible to have a potential application of a PERS model in the territory around Ragusa
- Evaluation of potential correlation between geodynamic phenomena (earthquakes) and variation of radon concentration in soil.
- New guide lines setting up for Radon concentration measurement in air and living rooms.

These projects allow to concentrate in only one data centre site all the measure values coming from the seismological and Radon network. These could be very interesting, allowing a real time evaluation of two data sets.

Figures 3, 4 and 5 show the graphics variations of radon concentrations, including temperature, humidity, atmospheric pressure, measured from 21/07/2003 to 31/07/2003 from station of Ragusa, Modica and Sicily.

In the same research contest the health risk of high level radon concentration has not been neglected. For this purpose a further Radon Monitor in air (*AlphaGUARD PQ2000 - GENITRON GmbH)* has been acquired. This will allow in this Radon monitoring project a further contribution to the Radon concentration evaluation in living places and regularly frequented by people. In this step, this goal requires a Radon concentration evaluation in a building owned by Authority Province of Ragusa.

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