

**The individuation of regional discontinuities using photogeological analysis and soil gas survey:
the Comino Valley (Central Italy).**

Ciotoli¹ G., Lombardi¹ S., Mariotti¹ G., Saroli² M.

¹Earth Science Department - University "La Sapienza", Piazzale A. Moro 5, 00185 Rome, Italy

²DiMSAT- Cassino University, Via G. Di Biasio 43, 03043 Cassino (Fr), Italy

keywords: Val Roveto-Atina-Caserta fault, Moho step, soil gas geochemistry, radon anomalies

A multidisciplinary study based mainly on aerophotogeological interpretation and geochemical prospectings were performed in the Comino valley area which extends between Vicalvi and San Donato Val di Comino villages. The studied area covers 70 km² of a considered key-area in the geological-seismic framework of the Central Apennines. The Comino valley is located in the SW sector of the Central Apennine (Southern Latium) where the "Val Roveto-Atina-Caserta" regional fault has been studied since many years. Indeed, according with some authors, this fault can be interpreted as a crustal discontinuity probably corresponding to a deep step of the Moho. The studied area is also characterized by the presence of secondary tectonic lineaments (e.g. San Donato-Val Comino fault) having a typical Apenninic orientation (NW-SE).

The Comino valley is affected by high seismic activity: last destructive earthquake was in May 7, 1984 (ML 5.9) while during 2009 many seismic events (ML < 4) have occurred for several months suggesting a new micro-seismic activity.

The spatial soil-gas distributions have been compared with the location and orientation of brittle deformations described in the literature and/or recognized by new field surveys, as well as with morphotectonic features obtained by photogeological analysis. Soil gas results show a pervasive character of the radon, helium and methane values. Soil gas prospecting together with geological survey has provided an inédited and detailed mapping of the structural setting of the studied area and in particular new data about the Comino valley have been acquired. The identified structural lineaments by geological survey as well as the He, CH₄ and Rn anomalies in soil gas in correspondence of lineament crossing, suggest that such faults may be considered as the surface expression of a deep structure network (probably down to the Moho) playing a role of important avenue for a vertical and rapid migration of endogenetic gases. In particular, the high Rn median value (51.80 Bq/L) in an area without shallow possible radon sources, suggests a deep origin for this gas and therefore a vertical migration through fractured media, i.e. faults and fractures. The elongated gas anomalies show that the area is characterized by tectonic discontinuities oriented

mainly NNW-SSE in accordance with and linked to the regional Val Roveto-Atina-Caserta fault and WSW-ENE that suggest transversal fractured zones.

The investigated area is also interested by mineralized springs with a high gaseous component: CO₂ is the dominant gas (concentrations > 95 %, v/v) but also discrete amounts of CH₄ have been measured (max value: 4200 ppm). The spatial distribution of thermal springs, cold CO₂-rich springs and localized gas emissions suggests that the structural framework of the studied area, i.e. the bordering faults of buried structural highs of the carbonate basement, exerts a strong control on the uprising patterns of fluids.