

Monitoring Natural Occurring Asbestos in ophiolite sequences and derived soils: implication with human activities

Rosalda Punturo (1), Andrea Bloise (2), and Rosolino Cirrincione (1)

(1) University of Catania, CATANIA, Italy (rosaldapunturo@gmail.com), (2) University of Calabria, Rende, Italy

The present contribution focuses on soils that developed on serpentinite-metabasite bedrocks, which could potentially be rich in asbestos minerals and, as a consequence, have a negative impact on agricultural activity and on environmental quality.

In order to investigate the natural occurrences of asbestos (NOA) on the surface of the soil formed from serpentinites and metabasite, we selected a study area located in Sila Piccola (Calabrian Peloritani Orogen, southern Italy), where previous studies highlighted the presence of asbestiform minerals within the large ophiolitic sequences that crop out (Punturo et al., 2015; Bloise et al., 2015).

Agricultural soil samples have been collected mainly close to urban centres and characterized by using different analytical techniques such as X-ray powder diffraction (XRPD), transmission electron microscopy combined with energy dispersive spectrometry (TEM-EDS), thermogravimetry (TG) and differential scanning calorimetry (DSC). Results pointed out that all the collected soil samples contain serpentine minerals (e.g., chrysotile), asbestos amphiboles, clays, chlorite, muscovite, plagioclase and iron oxides in various amounts. Electron microscope images of the soils show that they contain a variety of aggregating agents such as organic matter and clay in which individual fibres of chrysotile and tremolite-actinolite are trapped.

The investigation showed that both serpentinite and metabasite rocks act as a perennial source of contamination for the agriculture lands because of the high amount of tremolite-actinolite found in the studied soil samples developed on such lithotypes. Even if asbestiform minerals usually occur in aggregates which cannot be suspended in the air, agricultural activities such as plowing can destroy these soil aggregates with the creation of dust containing inhalable asbestos fibres that evolve into airborne increasing the exposure of population to them.

Since the dispersion of fibres could be associated with carcinogenic lung cancer, in our opinion further research is required to investigate the variation in the asbestos content in soils with increase in distance from serpentinites outcrops, in order to assess the non-occupational lifelong exposure of population to Natural Occurring Asbestos.

References

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