# Environmental problems related to serpentinites in the Pollino Geopark (Southern Appennine)

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*Keywords*: Asbestos-bearing serpentinites, amphiboles, inertization.

Recent publications have clearly showed the toxicity and carcinogenicity of asbestos-bearing serpentinites. Inhalation of asbestos-like minerals (chrysotile, crocidolite, cummingtonite-amosite, tremolite, anthophyllite) due to environmental exposure cause malignant mesothelioma and lung cancers. In particular, the serpentinites represent a serious enivironmental concern due to both the presence of asbestos-like minerals and the large Cr abundance that is prone to solubilisation as Cr(VI). At the Calabria-Lucania boundary (southern Apennines, Italy), ophiolitic rocks of the Frido Unit crop-out. In these rocks, the amphibole-like minerals (actinolite and tremolite) are typically intergrown with fibrous antigorite and chrysotile (serpentine mineral group). These minerals showing acicular, friable, fibrous, and elongated habitus can be easily released into the environment as a result of both natural processes and anthropogenic activities. In the analyzed rocks, the electron microprobe analysis (EMPA) revealed for the first time the presence of new amphiboles. Structural formula of amphiboles was recalculated on the basis of 23 oxygens and classified by using the amphiboles nomenclature suggested by Leake et al. (2004). The EMPA revealed that the average composition obtained on single crystals include Ca-amphiboles and Mg-Fe-Mn amphiboles. In particular, the calcic amphiboles include: edenite, magnesio-ferro-hornblende and canniloite while the magnesium-iron-manganese amphiboles is cummingtonite-grunerite (amosite). This cummingtonite-grunerite (amosite) in many cases is acicular to asbestiform in habit. Edenite is not considered as an asbestos-like mineral but a cluster of deaths from pleural mesothelioma was previously reported for Biancavilla, Italy, a city in eastern Sicily. A possible solution could be represented by mineral carbonation processes (Evans et al., 2013). Carbonation consists of an induced exothermic alteration of metal-rich silicate minerals involving geologically and thermodynamically stable carbonate minerals. This process would lead to the inertization of asbestos-bearing serpentinites, $CO_2$ capture-storage and mitigate the risks of future climate change.

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