Groundwater asbestos contamination in Naturally Occurring Asbestos (NOA) rich areas: a study on fibres characteristics, concentration and their possible mobility in aquifers

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In Naturally Occurring Asbestos (NOA) rich areas, weathering and erosion of asbestos-bearing rocks (e.g. meta ophiolites) are likely to cause water asbestos pollution: this may occur as a consequence of superficial and groundwater flow through natural rock formations containing NOA, depending on the characteristics of either the rocks and hence the water.

Concerning groundwater management in NOA settings, asbestos pollution has to be considered with regard to water quality assessment: it represents an environmental problem and could even constitute a risk for human health. In fact, waterborne asbestos can come into contact with human beings as airborne fibres after water vaporization, or by ingestion, especially if they are present in drinking water. While a lot is known about diseases caused by airborne asbestos respiration (e.g. IARC, 2012), not enough has been yet understood about potential noxiousness of its ingestion. Consequently, a Maximum Contaminant Level for asbestos in potentially usable water has not been defined yet (WHO, 2020).

To investigate possible groundwater pollution by asbestos due to natural environmental causes, a study area was selected in Piedmont, nearby NW Alps which are rich in NOA (and naturally occurring asbestiform minerals non-asbestos classified) (Belluso et al., 2019). In this area, two sampling and analysis campaigns regarding surface waters and groundwater were settled to investigate if, how and which type of mineral fibres could occur in water, trying to correlate them to the geolithological and hydrogeological characteristics of the area.

The results of the two campaigns will be presented aiming to investigate asbestos and asbestiform fibres occurrence in water in relation to hydrochemical parameters, which are expression of the local hydrology and geolithology, and to evaluate seasonal variability. In addition, asbestos (and asbestiform) fibres transportation due to water flowing in NOA settings will be tested with a physical model, since a recent study highlighted possible asbestos mobility through soil (Mohanty et al., 2021): guidelines to create a flow model which describes mineral fibres mobility in porous aquifers will be presented following laboratory tests based on contaminated water circulation through packed columns.

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