



Experimental work of bioremediation
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Program and Abstracts

AquaTRAIN Final Conference

*Geogenic chemicals in Groundwaters and Soils:
 a research training network*

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**BRGM,
 Orléans France**



Geogenic Chemicals in Groundwaters and Soils: a research training network

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www.aquatrain.eu

Foreword

Dear Colleagues,

Geogenic chemicals are those that are naturally found in groundwaters and soils. Despite their 'natural' origin, concentrations of these geogenic chemicals, notably arsenic, selenium, fluoride, manganese, can be high enough to cause significant environmental and health risks. For example, in many parts of circum-Himalayan Asia, over one hundred million of people have been chronically exposed to groundwater arsenic, extensively utilised for drinking, irrigation and cooking, with devastating health consequences. In Europe, exposures are generally lower but there are still significant concerns. There is considerable importance, therefore, to understanding the occurrence and controls on the occurrence of geogenic chemicals both in Europe and elsewhere, explore remediation options and the implications for policymakers and regulators. These key aspects represent four major work areas within the AquaTRAIN Marie Curie Research Training Network as well as other groups in Europe and further abroad.

The objectives of this international conference, incorporating the final AquaTRAIN MRTN workshop, are:

- 1- to present state-of-the-art developments in all these 4 aspects of geogenic chemicals in groundwaters and soils – speciation, occurrence, remediation and implications for policy.
- 2- enable exchange of ideas between European and non-European based researchers, for example to see the potential applications of remediation, mapping, microbiological and speciation methods developed in Europe to other areas, and equally to explore how studies of highly impacted aquifers in Asia can inform studies in Europe.
- 3- identify key research questions and objectives and explore potential for collaborative research to address these objectives.

We are looking forward to meeting you in Orléans

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Selenium mobilization in soils due to volcanic derived acid-rain: an example from Mt Etna volcano, Sicily.

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The significant amounts of selenium emitted by volcanoes may have important impact on human health due to the nutritious requirement and toxic effects upon Se exposure. Although soils play an important role in determining the level in food and water and thereby human health, little is known about the behaviour of Se in volcanic soils. In this work we evaluated the Se release during rainwater-soil interaction under controlled conditions using soils collected at the flanks of Etna volcano and synthetic rain.

Mt. Etna, the biggest volcano in Europe, has been in a persistent active state for the last 200,000 years and is one of the most intensely monitored volcanoes of the world. Selenium enrichment has been previously observed in volcanic gasses (emissions 650 kg Se per day), rainwater (up to 20 $\mu\text{g L}^{-1}$) and groundwater (up to 66 $\mu\text{g L}^{-1}$). Selenium leaching concentrations demonstrate a spatial distribution, which cannot be explained by plume deposition, total Se soil concentrations or the presence of Fe oxides. However, Al compounds and in minor extent SOM were indentified as the active control phases the Se mobilization during soil-rainwater interaction. This shows the importance of soils as reactive interfaces. A selenium flux towards the aquifer occurs when volcanic derived acid rain interacts with poorly-developed soils close to the crater. This geogenic process influences the chemical composition of groundwater and as a result, human health.