Geophysical Research Abstracts
Vol. 16, EGU2014-11906, 2014
EGU General Assembly 2014


# Mineral-microorganism interactions in Acid Mine Drainage environments: preliminary results

Cristina Carbone, Mirca Zotti, Marina Pozzolini, Marco Giovine, Simone Di Piazza, Mauro Mariotti, and Gabriella Lucchetti

DISTAV, Genova, Italy (carbone@dipteris.unige.it)

Minerals play a key role in controlling the mobility and distribution of metals and metalloids of environmental concern in supergenic environments. These are involved in a variety of processes, spanning the alteration of primary minerals to the formation of secondary authigenic phases and can represent a source or a trap for Potentially Ecotoxic Elements (PTEs). Soil, sediments, and waters heavily polluted with PTEs through AMD processes are a reservoir of a unusual bacteria and fungi well adapted to these toxic environments. Classical studies of biotic weathering have mainly focused on water-mineral interaction and on the ability of microorganism to influence the soil solution chemical composition. In this work, we analyzed two different representative ochreous and greenish-blue AMD colloidal precipitates in order to i) characterize the biota population present in these colloidal minerals and ii) verify the bioaccumulation of PTEs into the fungi and the potential impact of bacteria in the geochemistry of the system. The samples are composed by nanocrystalline goethite which contains high amounts of Fe, Cu, Zn, Pb, and Ni and woodwardite that is characterized by Cu, Zn, Ni, Y, and Ce. These precipitates were examined in order to evaluate the presence of fungal strains and to extract bacteria DNA. The preliminary results of fungi characterization show an interesting and selected mycobiota able to survive under unfavourable environmental conditions. A significant number of fungal strains was isolated in pure culture. Most of them belong to the genus Mucor and Penicillium. It is worth noting the presence of Trametes versicolor, a macrofungal lignicolous species already known for heavy metal biosorption capability from aqueous solution (Gülay et al 2003). The same colloidal precipitates have been processed to extract bacteria DNA, using a specific procedure developed for DNA extraction from sediments. The results gave a good yield of nucleic acids and the positive PCR amplification of 16S rDNA accomplished the first step for future metagenomic analysis.
Gülay B., Sema B., M. Yakup A.. 2003 Biosorption of heavy metal ions on immobilized white-rot fungus Trametes versicolor. Journal of Hazardous Materials B101 (2003) 285–300