Pioneering fungi and their role in initial weathering of Damma glacier forefield granite in the Swiss Alps

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Methods

Fungi were isolated from fine granitic sand from 15 sampling points within a 20x40 m area in front of the Damma glacier in the Central Swiss Alps. From more than 50 fungal isolates grown on nutrient agar at cold temperatures, 30 isolates were selected and the small subunit ribosomal DNA partially sequenced in order to identify them [1].

Discussion of Results

Sequences revealed, that the isolated fungi belong to three fungal divisions and at least 13 species (Table 1). A few fungal species (*G. pannorum, A. sarcoides*) were already isolated and sequenced from antarctic and subarctic areas [2, 3].

The weathering potential of these fungal species will be estimated after dissolution experiments with granitic sand in weak nutrient solutions will be completed. These experiments will reveal which organic acids these fungal isolates are able to exude and which elements they are capable to dissolve.

Ascomycota	**Zygomycota**
Penicillium chrysogenum	*Umbelopsis isabellina*
Penicillium decumbens	*Mucor hiemalis*
Paecilomyces fumosoroseus	*Mortierella alpina*
Geomyces pannorum	*Mortierella parvispora*
Trichoderma viride	
Ascocoryne sarcoides	**Basidiomycota**
Hyponectria buxi	*Psilocybe montana*
Metacordyceps yakusimensis	

Table 1: Fungi isolated from the Damma glacier forefield.

[1] Borneman & Hartin (2000) *Appl. Environ. Microbiol.* **66,** 4356-4360. [2] Hughes *et al.* (2003) *Appl. Environ. Microbiol.* **69**, 1488-1491. [3] Allison *et al.* (2008) *Global Change Biol.* **14**, 1156-1168.

Trace element behaviour in connection to the geological storage of CO_2: Lessons from natural analogues

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Introduction

Geological storage of captured carbon dioxide is being contemplated as one of the alternatives for CO_2 atmospheric content reduction. The Spanish government has launched an ambitious pilot project in CCS, which is managed by CIUDEN to provide the scientific and technical basis for the safe capture and storage of CO_2.

It is well known that many fluid-rock interactions will occur when supercritical CO_2 will be injected into the hosting rock leading to the solubilisation of trace components in the system. Dissolved carbon dioxide is known to enhance the solubility and mobility of critical trace elements ([1], [2], [3]) and evidences of post-injection mobilisation of iron and mobilisation of CO_2 to shallower depths are available. This is a process of concern when assessing the environmental risk related to the geological storage of CO_2.

Methodology and Results

One of the keystones of the CIUDEN R&D programme on geological storage of CO_2 is the study key geochemical processes responsible for the retention/migration of CO_2 in natural occurrences, also known as Natural Analogues.

In this context, we have revised and compiled information concerning a number naturally occurring CO_2 abundances in Spain, in order to investigate evidences for enhanced trace element mobilisation and retention. The main findings of this preliminary investigation will be discussed in the light of the known chemical behaviour of these trace elements by using a combination of observations in the investigated sites and advanced geochemical modelling techniques. The results will provide insight on the potential environmental risks associated to the geological storage of CO_2.

[1] Bruno (1990) *Marine Chem* **30**, 231-240. [2] Malström *et al.* (1996). *J. Cont. Hyd*. **21**, 201-213. [3] Grivé (2005). Doctoral thesis, UPC.