Geophysical Research Abstracts, Vol. 9, 05240, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-05240

Soil fungi dissolving apatite in response to phosphorus availability

A. Rosling (1,3), K. B. Suttle (1), E. Johansson (2), P. A. W. van Hees (2), J. F. Banfield (1)

(1) Department of Earth and Planetary Science, UC Berkeley, USA, (2) Man-Technology-Environment Research Centre, Örebro University, Sweden, (3) Department of Forest Mycology and Pathology, SLU, Sweden (Anna.Rosling@mykopat.slu.se / +46 18-673599)

We conducted mineral dissolution experiments using fungi isolated from a grassland soil in northern California to determine the response of fungi to different levels of phosphorus availability and to identify pathways of apatite dissolution by fungal exudates. Fluorapatite dissolution experiments were performed either with fungi present or under abiotic conditions using cell-free liquid media conditioned by fungal growth at different phosphorus and calcium availabilities.

Among biogeochemically active soil fungal isolates apatite dissolution was either active in response to phosphorus limiting growth conditions or passive as a result of mycelial growth. Zygomycete isolates in the order of Mucorales acidify their growth media substrate in the presence of phosphorus, mainly through production of oxalic acid. Cell-free exudates induced fluorapatite dissolution at a rate of $10^{-0.9\pm0.14}$ and $10^{-1.2\pm0.22}$ μmol P/m^2/s. The Ascomycete isolate, in the family *Trichocomaceae*, induced fluorapatite dissolution at a rate of $10^{-1.1\pm0.05}$ μmol P/m^2/s by lowering the pH of the media under phosphorus-limited conditions, without producing significant amounts of low molecular weight organic acids (LMWOAs).

Oxalate strongly etches fluorapatite along channels parallel to [001], forming needle like features, while exudates from *Trichocomaceae* induced surface rounding. We conclude that while LMWOAs are well-studied weathering agents these does not appear to be produced by fungi in response to phosphorus limiting growth conditions.