Geophysical Research Abstracts
Vol. 12, EGU2010-4378, 2010
EGU General Assembly 2010

Mineral seqestration of CO2 - The CarbFix project

Sigurdur Gislason (1), Domenik Wolff-Boenisch (1), Andri Stefansson (1), Eric Oelkers (2), Einar Gunnlaugsson (3), Holmfridur Sigurdardottir (3), Bergur Sigfusson (3), Wallace Broecker (4), Juerg Matter (4), Martin Stute (4), and the Sigurdur R. Gislason Team

(1) University of Iceland, Institute of Earth Sciences, IS 101 Reykjavik, Iceland (sigrg@raunvis.hi.is, 354 525 4497), (2) CNRS/UMR 5563, Université Paul Sabatier, France, (3) Reykjavik Energy, Iceland, (4) Lamont-Doherty Earth Observatory, Columbia University, USA, (5) Iceland GeoSurvey, Reykjavík Iceland.

Carbonate minerals provide a long-lasting, thermodynamically stable and environmentally benign carbon storage host. Mineral storage is in most cases the end product of geological seqestration of CO2. The degree to which mineral storage is significant and the rate at which mineralization occurs depend on the rock type and injection methods. The rates could be enhanced by injecting CO2 fully dissolved in water and/or by injection into silicate rocks rich in divalent metal cations such as basalts and ultra-mafic rocks. The CarbFix project (Gislason et al. 2009; www.carbfix.com) aims at mineral sequestration of carbon in southwest Iceland early 2010. Carbon dioxide, fully dissolved in water, will be injected into basaltic rocks at about 500 m depth. The initial test injection will be 0.07 kg/s of CO2 dissolved in 2 kg/s of water. If successful, the experiment will be up-scaled. Conservative tracers and 14C labelled CO2 will be mixed into the injected gas and water stream to monitor the subsurface transport and to constrain the carbonate mass balance. The CO2 gas will be pumped into the injection well, at 25 bar CO2 pressure at about 300 m depth. The pH of the water after dissolution at 25 bar in-situ partial pressure of CO2 is estimated to be 3.7 and the dissolved inorganic carbon concentration (DIC) to be $\sim$1 mol/kg. As the CO2 charged waters percolate through the rock the dissolution of mafic minerals and glass will consume the protons provided by the carbonic acid. Concomitantly, the concentration of dissolved elements will increase and alteration minerals form, resulting in mineral fixation of carbon.

References.
Gislason S. R., D. Wolff-Boenisch, A. Stefansson, E. H. Oelkers, E. Gunnlaugsson, H. Sigurdardottir, B. Sigfusson, W. S. Broecker, J. M. Matter, M. Stute, G. Axelsson and Th. Fridriksson (2009). Mineral sequestration of carbon dioxide in basalt: A pre-injection overview of the CarbFix project. Int. J. Greenhouse Gas Control, (in press) doi:10.1016/j.ijggc.2009.11.013