



**Geological carbon capture & storage in mafic and ultramafic rocks**  
*IODP/ICDP Workshop on the role of oceanic and continental scientific drilling*  
**-First circular-**

Muscat, Sultanate of Oman

8-10 January, 2011 with optional field trips on January 11 & 12

Mitigation, avoidance and possible reduction of increasing atmospheric CO<sub>2</sub> concentrations due to burning of hydrocarbons are among the most pressing technological challenges to society. Geological carbon storage is a key component of many mitigation strategies. In situ mineral carbonation may be the safest and most effective means to achieve this. In addition to storage, geological carbon capture via fluid/rock reactions that remove carbon from air or surface waters may provide an alternative to industrial CO<sub>2</sub> capture and transport, and a route to achieve “negative emissions” should atmospheric CO<sub>2</sub> concentrations become unacceptably high in the future.

This workshop will engage scientific communities associated with the Integrated Ocean Drilling Program (IODP) and the International Continental Scientific Drilling Program (ICDP) with colleagues from the hydrocarbon, mining and related industries, and with policy makers, to raise the profile of research on geological carbon capture and storage, with particular focus on the potential for storage in ultramafic and mafic rocks. We will explore the role of scientific research, and particularly scientific drilling, in research and development.

Ultramafic and mafic rocks are the most abundant rocks at the Earth’s surface. Observations of active and ancient hydrothermal systems demonstrate rapid and abundant formation of carbonate minerals via reaction of fluids with these rocks. However, in contrast to the many large pilot studies of CO<sub>2</sub> storage into pore space in sedimentary basins, the high carbonation potential of mafic and ultramafic rocks has received relatively little attention. This workshop will develop partnerships between industry and the oceanic and continental scientific drilling communities to evaluate the potential for CO<sub>2</sub> storage in igneous rocks, and its environmental, economical and societal benefits.

From a geological perspective, natural mineral carbonation is inextricably linked with mineral hydration, occurring mainly in near-surface hydrothermal and weathering environments. Understanding of such natural processes provides essential insight into design of enhanced, in situ mineral carbonation systems. At the workshop, we will explore opportunities to couple basic research on enhanced mineral carbonation techniques with ongoing, complementary studies of hydrothermal alteration and weathering, and of chemosynthetic biological communities in these environments.

By bringing together specialists researching the biogeochemical, mineralogical, mechanical and hydrodynamic processes associated with the reaction and storage of CO<sub>2</sub>-rich fluids in ultramafic and mafic rocks, with representatives from industry, we will integrate knowledge of natural hydrothermal systems, laboratory experiments and numerical modeling, and the first injection tests in mafic reservoirs, to define the required characteristics for geological carbon storage in ultramafic and mafic rocks and identify potential sites for developmental deployment of this nascent technology. At the same time, the workshop will develop partnerships between scientists working on related fields, to ensure that we derive the maximum research benefit from future scientific drilling projects.

Participation will be limited to about 60 people. Cost in Oman, including housing and food, is estimated at \$130 per day, plus \$65 per day for optional field trips to view exceptional outcrops of mineral carbonation systems in the context of the geology of northern Oman. There are several ongoing efforts to raise funds to defray travel and meeting costs, for young people and for keynote speakers. Application procedure, actual cost and funding will be described in the second circular.

Steering Committee: M. Godard (CNRS/UM2, France), P. Kelemen (LDEO, USA), S. Nasir (SQU, Oman), D. Teagle (NOCS, UK), A. Al Rajhi (OGS, Oman), W. Bach (MARUM, Germany), K. Becker (RSMAS, USA), A. Bonneville (PNL, USA), G. Dipple (UBC, Canada), G. Früh-Green (ETHZ, CH), S. Gíslason (UI, Iceland), D. Goldberg (LDEO, USA), Ph. Gouze (CNRS/UM2, France), M. Hesse (UT, USA), B. Ildefonse (CNRS/UM2, France), J. Matter (LDEO, USA), Ph. Pézard (CNRS/UM2, France), K. Suyehiro (IODP, Japan)

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