Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

MIS010-01 Room: 303 Time: May 23 09:00-09:15

What is the Deep Carbon Observatory?

Robert Hazen[1*]

[1]Geophysical Laboratory

The Deep Carbon Observatory (DCO) is a multi-disciplinary, international initiative dedicated to achieving a transformational understanding of Earths deep carbon cycle, including its poorly-constrained reservoirs and fluxes, the unknown role of deep biology, and unexplored influences of the deep carbon cycle on critical societal concerns related to energy, environment and climate.
Past considerations of the global carbon cycle have focused primarily on oceans, atmosphere and shallow surface environments, as if these reservoirs behave as an essentially closed system. However, recent experimental discoveries of high-pressure and temperature organic synthesis from inorganic precursors, complex interactions between organic molecules and minerals, field evidence for significant outgassing of C-O-H-N volatiles, observations of deep microbial ecosystems and of anomalies in petroleum geochemistry, and theoretical models of carbon sources and sinks demand a careful reappraisal of deep carbon.
A comprehensive, interdisciplinary research program is needed to investigate Earths dynamic deep carbon cycle in the broad context of planetary volatiles. Accordingly, the DCO will promote a new widely distributed network of facilities that integrate high-pressure technology, nanoanalysis, high-resolution mass spectrometry, and computation. Insights from chemistry, physics, biology, and Earth sciences will merge to promote understanding of the complex interdependences of nonliving and living processes, spanning the surface to great depth, and at length scales from nano to global, while including the full range of Earths 4.56-billion-year history.

Keywords: carbon, carbon cycle, geobiology, drilling, deep life, Deep Carbon Observatory