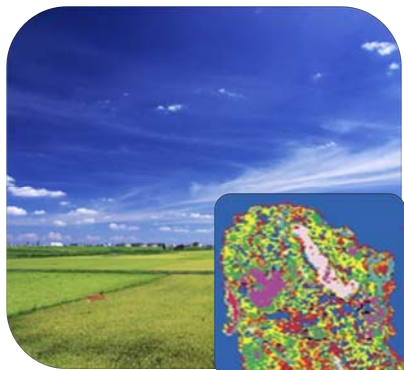


Combating Climate Change



Cluster map of carbon forms

Understanding Carbon in Soil

Using the CLS and the NSLS in New York, scientists have analyzed soil samples from locations around the world and found that the arrangement of molecules and the ways they adhere to the surface of mineral particles varied at scales of a billionth of a metre. This suggests that where particular molecules are located in the soil could be critical to our understanding of how soil absorbs, stores and releases carbon, in response to changes in ecology and climate. 🌸

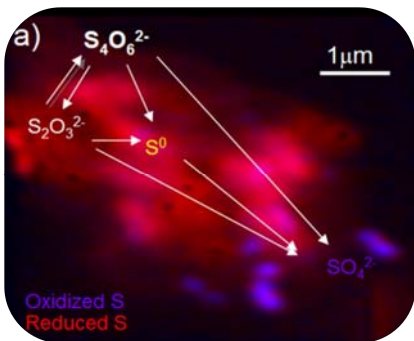
Lubman et al. 2008. Spatial complexity of soil organic matter forms at nanometer scales. *Nature Geoscience*, 1, pp. 238-42. DOI: 10.1038/ngeo0155



CO₂ Sequestration

Injecting carbon dioxide (CO₂) into oil wells extends the production life of oil fields and benefits the environment by trapping damaging CO₂. CLS scientists are working to develop ways to improve existing oil recovery technology by creating 3D images of rock core samples. From these 3D images researchers can study changes in the mineral composition of the rocks, as well as their pore or air-space networks, allowing for a better understanding of the interaction between injected CO₂ and different types of minerals underground. 🌸

CLS Activity Report 2007



Sulphur-eating Bacteria Limit Acid Run-off and CO₂

Acid Mine Drainage (AMD) is caused when sulphur in mine tailings reacts with water and oxygen in the environment to produce sulphuric acid. It is a major environmental concern for lake acidification and water quality. In addition, the sulphuric acid dissolves carbonate minerals in the underlying rock, releasing carbon dioxide into the atmosphere. Using the CLS, researchers from McMaster University have found that two species of bacteria isolated from a mine tailings pond in northern Ontario work together to limit the amount of sulphuric acid produced by sharing the sulphur in the tailings as an energy source. 🌸

Norlund et al. 2009. Microbial Architecture of Environmental Sulfur Processes: A Novel Synthetic Sulfur-Metabolizing Consortium. *Environmental Science and Technology* 43, pp. 8781-8786. DOI: 10.1021/es902616k



Marine Life and Global Warming

Researchers at the CLS are studying how ocean diatoms, one of the most common forms of phytoplankton, store iron using an enzyme called ferritin. Iron is a key limiting factor in how these organisms grow, and the growth of blooming phytoplankton could be important in the fight against global warming – forcing diatoms to bloom by seeding the ocean with iron has been suggested as a strategy for CO₂ capture. 🌸

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