Science & Technology

Rock-solid Co2 Storage

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Columbia scientists say they've devised a new method to store carbon dioxide underground so that it doesn't linger in the atmosphere and contribute to global warming. They envision that hot water containing huge quantities of pressurized CO2 could be poured into holes drilled in peridotite, a dense rock that makes up the earth's mantle.

Scientists have long known that peridotite reacts with CO2 to form a solid similar to limestone. The new insight of geologist Peter Kelemen, the Arthur D. Storke Memorial Professor in the department of earth and environmental sciences, and geochemist Juerg Matter, a research scientist at Lamont-Doherty Earth Observatory, is that peridotite reacts with CO2 at a faster rate than previously believed. This means that it might be economically feasible to store CO2 in the rock.

They made their discovery in Oman, one of a handful of places where the collision of tectonic plates has forced peridotite aboveground. Peridotite typically rests 20 kilometers underground, but a mountainous section of Oman roughly the size of Massachusetts is covered in it. Cracks in the peridotite are laced with the chalky white carbonate that forms wherever CO2-laden air or water comes into contact with the rock's rich minerals.

Kelemen and Matter demonstrated that the carbonate in the region isn't nearly as old as the peridotite, as most scientists had assumed. Using carbon isotope dating, they found that carbonate in the region is just 26,000 years old, on average, whereas the peridotite formed 96 million years ago. This indicated that the peridotite is absorbing up to 100,000 tons of carbon annually, far more than anyone thought. The scientists say that if deep holes were drilled, this region could absorb 20 percent of the CO2 humans spew into the air each year.

Petroleum Development Oman, the state oil company, is interested in a pilot program that would pump below the surface CO2 generated at nearby power plants. "This would afford a low-cost, safe, and permanent method to store CO2," says Kelemen, the lead author of the study in the November issue of the *Proceedings of the National Academy of Sciences*. "We see this as just one of a whole suite of methods to trap carbon. It's a big mistake to think that we should be searching for one method that will take care of it all."

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