Evaluating the seismic risk of mineral carbon sequestration

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Geologic carbon sequestration, in which carbon is captured and stored underground, has been proposed as one way to mitigate the climatic effects of carbon dioxide emissions. One method of geologic carbon sequestration is to inject carbon dioxide in aqueous solution into rocks. However, as the solution fills the pore space in the rocks, the fluid pressure on the rocks increases, potentially increasing the risk of earthquakes.

Another option would be to inject carbon dioxide solutions into mafic rocks; the silicate minerals in these rocks react with the carbon dioxide, leaving solid carbonate reaction products, which decrease the amount of pore fluid.

To determine how mineral carbonation reactions affect seismic risk, Yarushina and Bercovici created a simple model to see how these reactions influence stress on the rock during and after carbon dioxide injection. Their model shows that the chemical reactions reduce fluid pore pressure and distribute stress on the minerals over a larger area.

They conclude that mineral carbonation in mafic rock could minimize the seismic risk of carbon sequestration by underground injection as long as fluid pumping rates do not exceed a critical value.

More information: Mineral carbon sequestration and induced seismicity, *Geophysical Research Letters*, doi:10.1002/grl.50196, 2013
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