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On Pore Dynamics and Calcite Solubility in Carbonaceous Aquifers used in Energy Storage Applications[1] BS TILLEY, DS BRADY, Worcester Polytechnic Institute, M UECKERT, T BAUMANN, Technische Universitaet Muenchen — Geothermal energy harvesting applications use deep groundwater aquifers to store harvested energy. The impact of this additional energy to the aquifer chemistry is crucial for long-term operation. Gaseous CO2 is added to the injected water to compensate potential precipitates of carbonates and to prevent structural changes to the aquifer. Both of these effects affect the local chemical equilibrium of the aquifer, and we consider a long-wave model of this process for a single axisymmetric pore where gaseous CO2 concentration, temperature, fluid flow and hydrochemistry modify the pore radius in space and time. Substrates are composed of calcite and dolomite, whose composition evolution is part of the full pore problem. During oscillatory flow conditions, concentration levels of the dissolved species can be sufficient to overcome elevated temperature levels and promote pore closure for sufficiently thin pores. We identify the conditions under which this pore closure takes place.

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Burt Tilley
Worcester Polytechnic Institute

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