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The Rock Geochemical Model (RokGeM) v0.9

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Abstract. A new model of terrestrial rock weathering – the Rock Geochemical Model (RokGeM) – was developed for incorporation into the GENIE Earth System modelling framework. In this paper we describe the model. We consider a range of previously devised parameterizations, ranging from simple dependencies on global mean temperature following Berner et al. (1983), to spatially explicit dependencies on run-off and temperature (GKWM, Bluth and Kump, 1994; GEM-CO₂, Amiotte-Suchet et al., 2003) – fields provided by the energy-moisture balance atmosphere model component in GENIE. Using long-term carbon cycle perturbation experiments, we test the effects of a wide range of model parameters, including whether or not the atmosphere was "short-circuited" in the carbon cycle; the sensitivity and feedback strength of temperature and run-off on carbonate and silicate weathering; different river-routing schemes; 0-D (global average) vs. 2-D (spatially explicit) weathering schemes; and the lithology dependence of weathering. Included are details of how to run the model and visualize the results.

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