Title: A potential pathway for performing long-term climate simulations on Summit

Authors: Gunther Huebler, John Dennis, Vincent E. Larson

Abstract:

Summit is a highly parallel, GPU-based supercomputer operated by DOE. To run efficiently on Summit, an atmospheric simulation must provide lots of parallel work for the GPUs to do. This work can be provided by running a global cloud-resolving simulation, which has small grid spacing and hence many grid columns. However, the small grid spacing requires the use of short time steps and hence prohibits the completion of long-duration climate simulations.

An alternative way to provide work for the GPUs on Summit is to calculate parameterized physics on multiple sub-columns within each grid column. The physics calculations on each subcolumn can be calculated in parallel with respect to each other. The horizontal grid spacing can be kept coarse, allowing long time steps and long-duration climate simulations.

Here we present our progress in developing a climate model that computes microphysics on subcolumns. The subcolumn generator (“SILHS”) and the microphysics parameterization (“MG2”) have been GPU enabled. Timing and scaling results are presented.