LLNL-ABS-814890

Regionally refined model updates for the E3SMv2 atmosphere model

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In the Energy Exascale Earth System Model (E3SM) version 1, we established the regionally refined model (RRM) as an effective and efficient tool to develop the high-resolution atmosphere model. However, we had to retune the RRM based on the standard low-resolution version due to the poor scale-awareness of physical schemes. Developing a North America RRM configuration was a major focus of E3SMv2 development. In this presentation, we describe E3SMv2 RRM configuration improvements. A novel hybrid time-stepping approach for dynamics and physics avoids the need for RRM retuning, and unifies low-resolution and RRM configuration development. Combined with physics on the coarser (pg2) grid, RRM greatly improves model throughput. Preliminary E3SMv2 RRM results look promising. With these RRM improvements, we can simulate North America at high-resolution embedded in our standard low-resolution CMIP DECK experiments.

This work is performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.