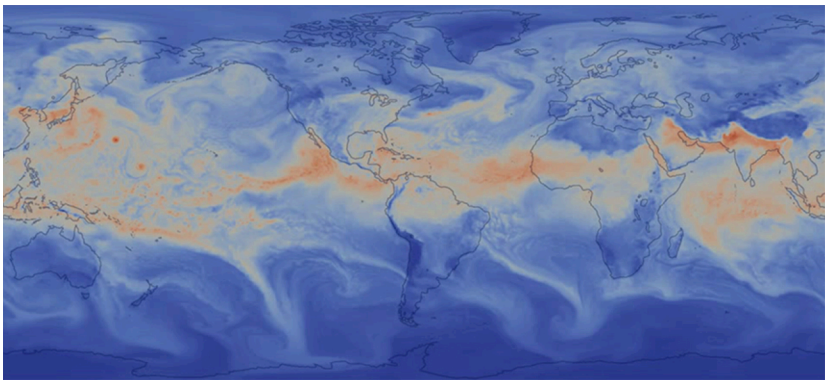
SAND2013-3668P

Implemented "Vertically Lagrangian" Option in the Community Atmosphere Model



A screenshot from the 2-year AMIP (Atmospheric Model Intercomparison Project) precipitable water animation simulation run of the NSF/DOE Community Atmosphere Model (CAM5).

The Community Earth System Model (CESM) is a state-of-the-art global climate model being developed with the support of the National Science Foundation and the Department of Energy and used for climate-change science and assessments. Sandia has been leading a multilaboratory effort to develop a new "dynamical core" for CESM's atmospheric component. This new dynamical core is based on the spectral element method and dramatically increases the scalability of the whole Earth System Model, making higher-resolution simulations possible on DOE's Leadership computing facilities.

This development work's final component was to update the numerical discretization to use a "vertically Lagrangian" approach that can better handle the sharp temperature gradients, resulting in an improved treatment of stratocumulus clouds. With this improvement, the model's spectral element configuration became competitive in terms of simulation quality with the older approaches, while achieving unmatched supercomputer performance. It is scheduled to be included in the May 2013 CESM public release.

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