

# **Performance portability for next generation HPC architectures in E3SM via the Kokkos programming model**

This work converts the atmospheric dynamical core (HOMME) of the Energy Exascale Earth System Model (E3SM) from the current CPU-centric implementation, in Fortran 90, to a new performance-portable implementation, in C++ with the Kokkos performance-portability framework. HOMME simulates the dynamics and physical processes of the atmosphere. It is the most computationally demanding part of E3SM. Kokkos provides performance-portable multidimensional arrays and intraprocess parallel execution constructs. These form an abstraction layer over the hardware architecture of a compute node within a supercomputer. We will present results for the performance of our implementation on conventional CPU, Intel Xeon Phi, and Nvidia GPU; compare performance with the original Fortran on CPU and Xeon Phi; and discuss details of the implementation.