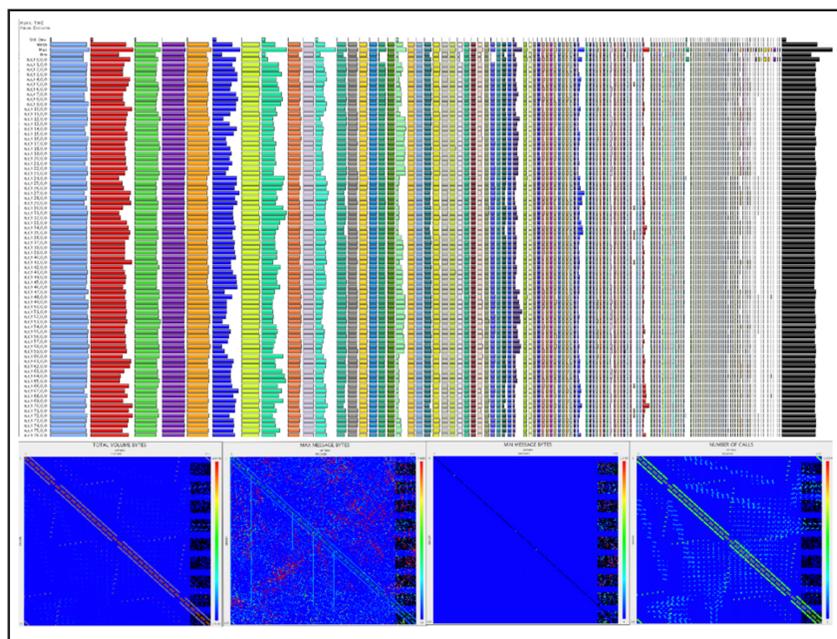


Sample MPIProf timing of MPI functions for each rank for a 1-day simulation of the Goddard Earth Observing System (GEOS) atmospheric general circulation model at C180 (~50-kilometer) horizontal resolution and 72 vertical layers. The simulation ran on the Discover supercomputer at the NASA Center for Climate Simulation (NCCS) using 216 MPI processes on 9 Haswell nodes with 24 processes per node. *Amidu Oloso, NASA/Goddard*



Sample Tuning and Analysis Utilities (TAU) profiling of a 1-day simulation of GEOS at C180 horizontal resolution and 72 vertical layers. The simulation ran on the NCCS Discover supercomputer using 216 MPI processes on 9 Haswell nodes with 24 processes per node. The top image shows the time taken by functions and areas of load imbalance. The bottom graphs show the communication matrices. *Amidu Oloso, NASA/Goddard*

# Understanding the Scalability and Computational Performance of GEOS

The Goddard Earth Observing System (GEOS) is a modular family of models primarily used by NASA's Global Modeling and Assimilation Office (GMAO) for conducting research in weather analysis and prediction, seasonal-to-decadal analysis and prediction, reanalysis, global mesoscale modeling, and observing system science. To prepare GEOS for running at higher resolutions on computers with very large CPU counts, it is important to understand its scalability and computational performance. Towards this end, researchers are examining several profiling and performance analysis tools to assess their usefulness in gaining better insights into GEOS computational performance.



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