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# Leveraging leadership class computing toward addressing climate and environmental challenges

*Tuesday, 1 October 2024 16:15 (15 minutes)*

Frontier and Summit, two of the largest supercomputers in the world, are hosted at the Oak Ridge Leadership Computing Facility (OLCF), and managed on behalf of the US Department of Energy (USDOE). They are also counted among "leadership class"systems in the world offering capability computing that accommodate modeling and simulations as well as data analytics and artificial intelligence applications at scale, not readily available at most capacity computing centers. The portfolio of recent computing projects at OLCF include kilometer scale earth system modeling, using the DOE Energy Exascale Earth System Model (E3SM) and the ECMWF Integrated Forecasting System (IFS), and the development of AI foundation models for climate and environmental applications. The presentation will summarize recent advances and highlights from computational earth and environmental sciences projects at OLCF, including: [a] global 3.5 km simulations using the DOE Simple Cloud Resolving E3SM Atmosphere Model (SCREAM); [b] the Oak Ridge Base Foundation Model for Earth System Predictability (ORBIT), a 113 billion parameter vision transformer model trained on CMIP6 simulations; and [c] two geoAI foundation models trained on large volumes of earth observation data from satellites.

## Topic

Needs and solutions in scientific computing: Digital Twins

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**Session Classification:**   Replicating and predicting complex systems with scientific Digital Twins