OAK RIDGE National Laboratory



HIGH-PERFORMANCE AND EDGE COMPUTING

Scalable compute powering geospatial research and production delivery

MISSION

Our mission is to transform how we gather, analyze, create, and share information about the world through technologies to provide real-time, dynamic answers to global scale geospatial challenges.

Geospatial computing is the key to enabling world-class research and development across national security sciences. Cutting-edge technologies combined with geospatial intelligence promote effective responses from the home front to the edge. These transformative solutions strengthen our infrastructure and improve community well-being.

IMPACT

GeoAI for precision military operations ORNL HPC systems and GeoAI tools deliver high-fidelity datasets on the built environment and global populations, enabling collateral damage estimations and rapid infrastructure damage assessments.

Powering disaster recovery efforts Autonomous systems and geospatial computing expertise converge to enable edge computing capabilities for rapid data delivery. This helps in disaster recovery efforts after natural disasters by assessing energy infrastructure damage, geolocating features of interest, and transmitting damage assessment results over constrained communication.

Deepening understanding with digital twins ORNL teams leveraging cutting-edge HPC technologies to develop geospatial digital twins: dynamic, real-time virtual representations of the physical world. Digital twins enable rapid, informed decision-making across various domains such as urban planning, mission operations, and environmental monitoring.





ORNL KEY DIFFERENTIATORS

Computing and large-scale GIS for global-scale geospatial intelligence

- ORNL carries a legacy of building the fastest supercomputers in the world, and with it, the knowledge of how to overcome HPC workflow challenges such as scale, complexity, observation and measurement. This expertise translates to geospatial operations on a global scale which require massive amounts of data and computational power to process expediently.
- ORNL researchers developed robust and resilient communications solutions that use AI/ML techniques at the edge, allowing for real time radio frequency spectrum adaption in noisy environments.
- Resilient communications experts can solve problems with high performance computing, edge devices, software-defined radios, and AI/ML techniques.
- Geoinformatics engineers transform world visualization through geodata—from population dynamics and land-use and transportation studies to emergency management and hazardous waste analysis.
- ORNL provides access to unparalleled national laboratory resources, including:
  - › high performance computing
  - › autonomous systems and artificial intelligence, and
  - › leading multidisciplinary teams across a wide range of skills and science areas.

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