the ENERGY lab

R&D FACTS

Geosciences

Geoscience Analysis, Interpretation, and Assessments Computational Facilities

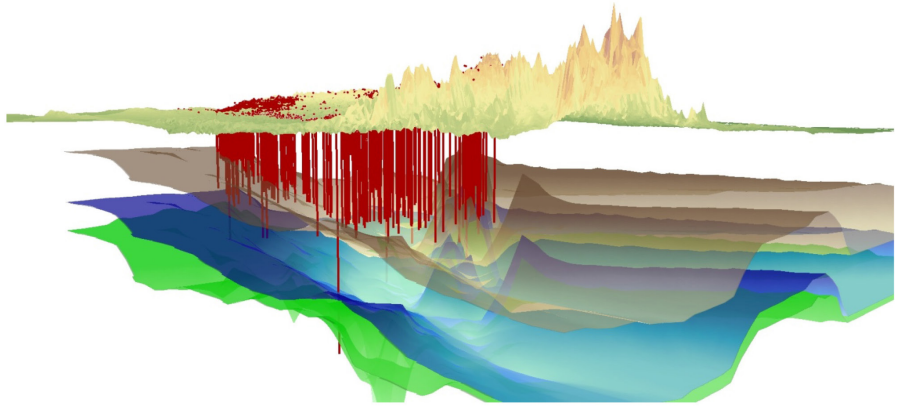
Description

Scientists at NETL's laboratories use the Geoscience Analysis, Interpretation, and Assessments (GAIA) Computational Facilities for collaborative research among the Albany, Oregon, Morgantown, West Virginia, and Pittsburgh, Pennsylvania, sites. The GAIA facilities allow geological and environmental sciences researchers to draw on common tools, data, and software in a coordinated environment that offers a common resource for conducting computer-based analytical work. The labs share common software and video connectivity for real-time collaboration and research.

Capabilities

The GAIA facilities let researchers coordinate their datasets using top-of-the-line research computers with key software, such as ArcGIS, Petra, GoldSim, and Earthvision, among other advanced geostatistical and analytical software packages. The computers are equipped with high-performance Intel processors, graphics cards, and large amounts of RAM. Real-time collaboration among researchers is facilitated through web cams and video/desktop sharing applications, such as Skype, Join.me, and WebEx.

In the GAIA facilities, researchers can evaluate and utilize datasets generated in the field and at other internal laboratories, like its geomaterials characterization and geoimaging facilities, as well as information gathered from external sources. With the GAIA facility capabilities, researchers can visualize, interpret, analyze, and model geospatial data sets from the lab or the real world.



3D visualizations like this one of topography and subsurface layers/intervals in the Appalachian Basin can be created using the GAIA facility. These interpretations are used in geospatial and geostatistical evaluations associated with CO_2 storage assessments, as well as subsurface risk and impact studies associated with hydrocarbon systems and underground injection and storage.

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U.S. DEPARTMENT OF ENERGY

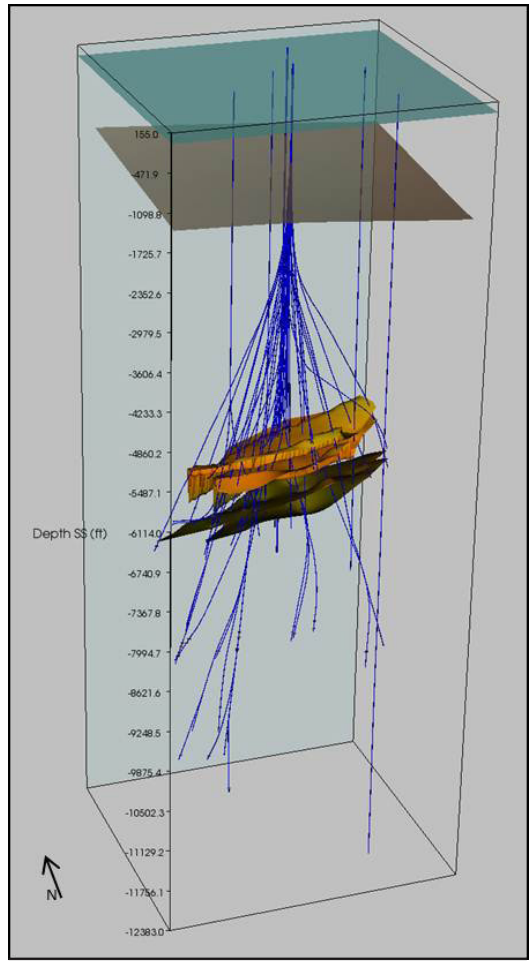
Ongoing research conducted in the GAIA facility encompasses a wide range of activities. Our researchers are studying engineered-natural systems related to a number of research topics, including assessing risks related to offshore hydrocarbon production and the recovery of unconventional resources like shale gas, estimating CO_2 storage potential in various types of geologic formations, and conducting computational analyses of wellbore cement and other key borehole materials.

Benefits

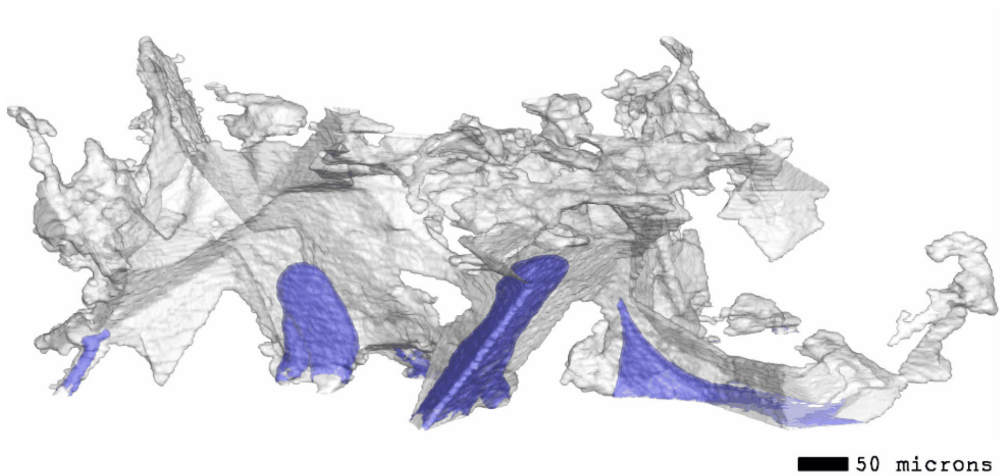
The GAIA facilities provide consistent access to research work stations at all three NETL sites for any researcher at NETL or research partner. GAIA facilities also provide a place for visiting scientists and researchers with NETL IT credentials to work at all three sites.

The science-based analyses conducted using GAIA facilities inform our understanding of geological systems, expose knowledge gaps, and drive further research. The integrated and collaborative setting of the GAIA facilities assists knowledge sharing across projects and disciplines, improving our chances of solving energy issues related to these systems.

Research carried out through the GAIA facilities helps ensure enduring access to domestic energy resources because it influences the safe and reliable use of our natural resources, development of new energy resources, and protection of the environment.



Reseasrchers created this 3D visualization of directionally drilled boreholes in the Gulf of Mexico, field MC109, showing NETL's interpretation of two reservoir sand intervals using GAIA facility resources.



The GAIA facility allows researchers to study multiphase computational fluid dynamics such as this example from a µmCT-derived image that shows CO_2 flow in pore space in a Mt. Simon sandstone core.