

The logo is a white hexagonal shape with a green border and four small white hexagons at the corners. Inside, the text 'AI' is in large green letters, 'FOR SCIENCE' is in smaller green letters, and 'TOWN HALL' is in the largest green letters.

AI FOR SCIENCE TOWN HALL

Earth and Environmental Sciences

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U.S. DEPARTMENT OF
ENERGY

Office of
Science

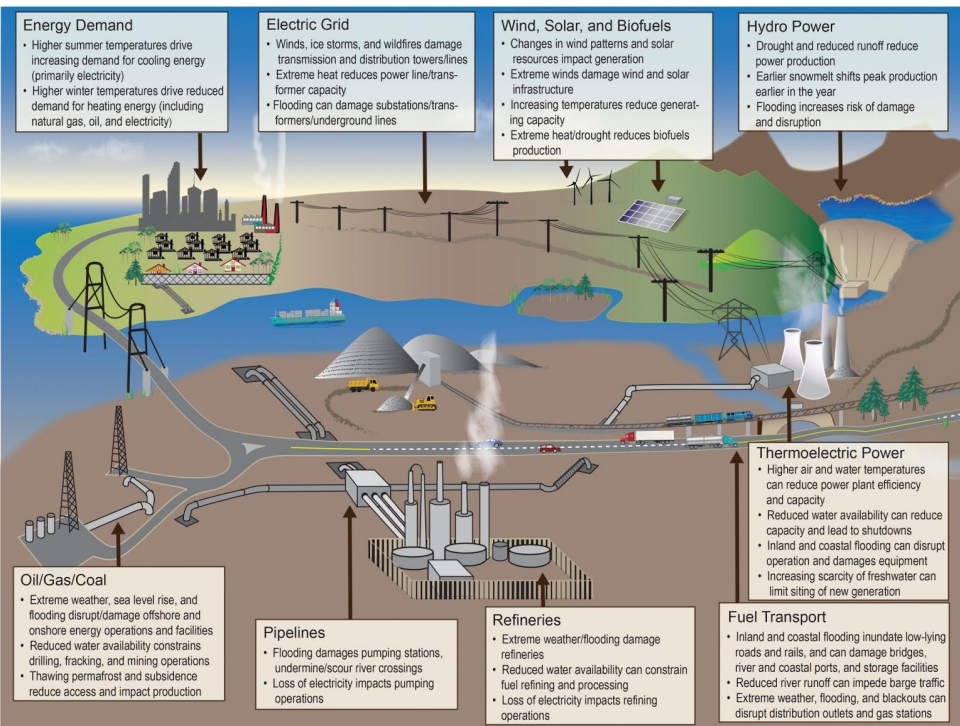
AI for Science Town Hall

- AI for Science Town Hall Meetings
 - Argonne National Laboratory, July 22–23, 2019
 - Oak Ridge National Laboratory, August 20–21, 2019
 - Lawrence Berkeley National Laboratory, September 11–12, 2019
 - Washington, DC (Renaissance DC - Downtown Hotel), October 22–23, 2019
- Final Report
 - Stevens, Rick, Valerie Taylor, Jeff Nichols, Arthur Barney Maccabe, Katherine Yelick, and David Brown (2020), AI for Science, United States, doi:[10.2172/1604756](https://doi.org/10.2172/1604756).
- Chapter 2: Earth and Environmental Sciences

AI
FOR SCIENCE
TOWN HALL

Washington DC Town Hall
October 22-23

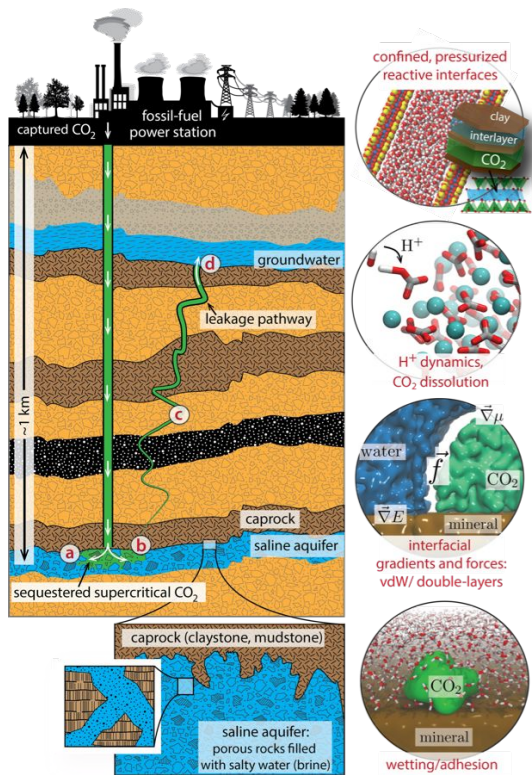
Grand Challenge #1



Project environmental risk and develop resiliency in a changing environment

- Increasing frequency of weather extremes and changing environment pose risks to energy infrastructure and the built environment
- Sparse observations and inadequate model fidelity limit the ability to identify vulnerability, mitigate risks, and respond to disasters

Grand Challenge #2



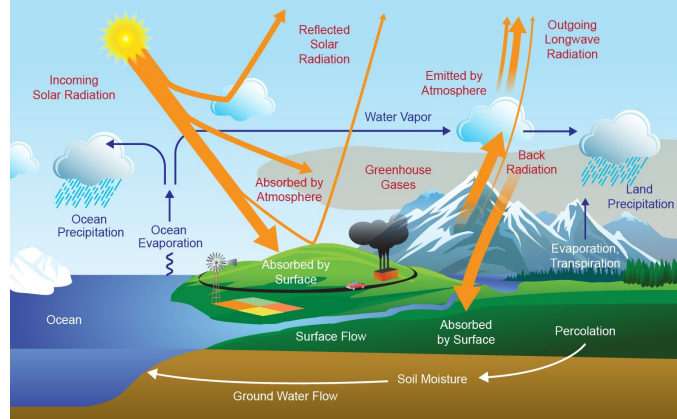
Characterize and modify subsurface conditions for responsible energy production, CO₂ storage, and contaminant remediation

- National energy security and transition to renewable energy resources relies on utilization of subsurface reservoirs for energy production, carbon storage, and spent nuclear fuel storage
- Subsurface data are uncertain, disparate, diverse, sparse, and affected by scaling issues
- Subsurface process models are incomplete, uncertain, and frequently unreliable for prediction

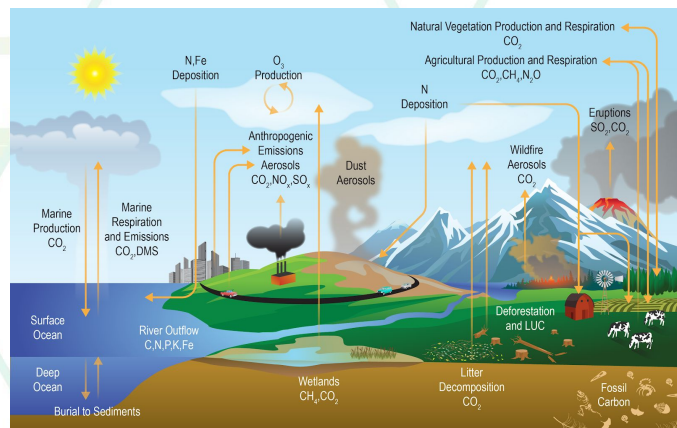
Grand Challenge #3

Develop a predictive understanding of the Earth system under a changing environment

- To advance the nation's energy and infrastructure security, a foundational scientific understanding of complex and dynamic hydrological, biological, and geochemical processes and their interactions is required (across atmosphere, ocean, land, ice)
- Knowledge must be incorporated into Earth system models to project future climate conditions for various scenarios of population, socioeconomics, and energy production and use



Energy & Water Cycles



Carbon & Biogeochemical Cycles

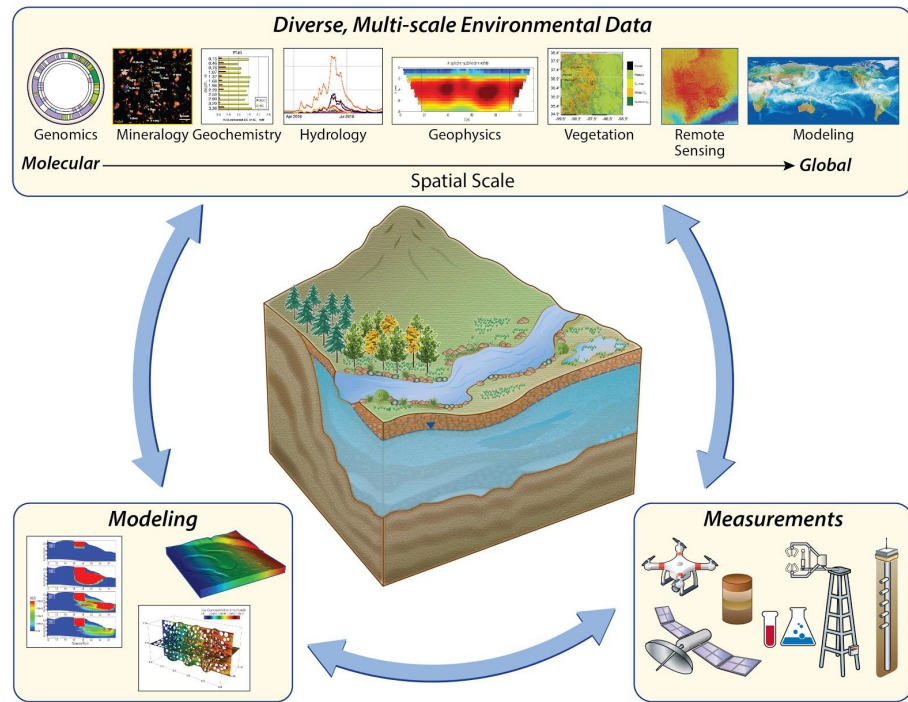
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Grand Challenge #4

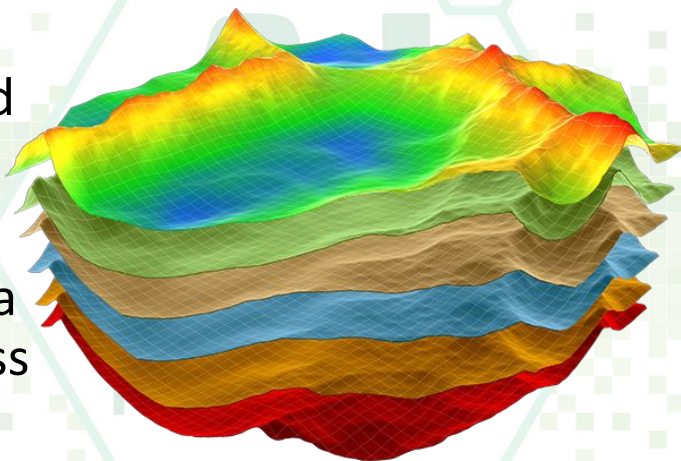
Ensure global water security under a changing environment

- Water resources are critical for energy production, human health, food security, and economic prosperity
- Water availability and water quality are impacted by environmental change, weather extremes, and disturbances such as wildfire and land use change



Expected Outcomes

- Model testbeds and surrogate models are expected to yield insights into process understanding across all Grand Challenges
- Data-driven and physics-constrained hybrid models are expected to stimulate new discovery and bridge space and time scales
- Integrated models of Earth system processes and energy/built infrastructure will enhance national energy and water security through simulation
- AI methods will enable effective use of large data streams for energy production, predictive process understanding, and environmental resiliency



Washington DC Town Hall
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