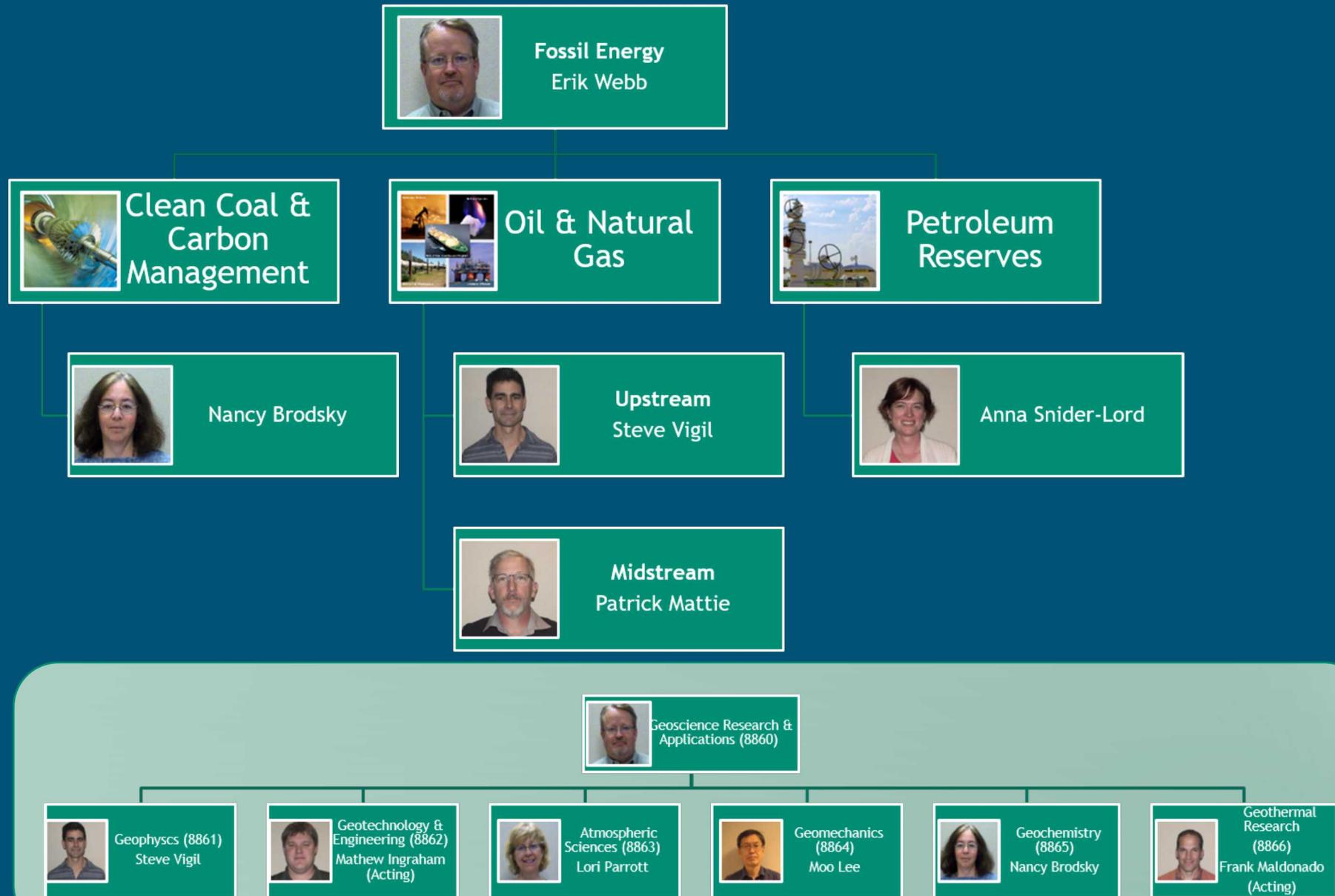


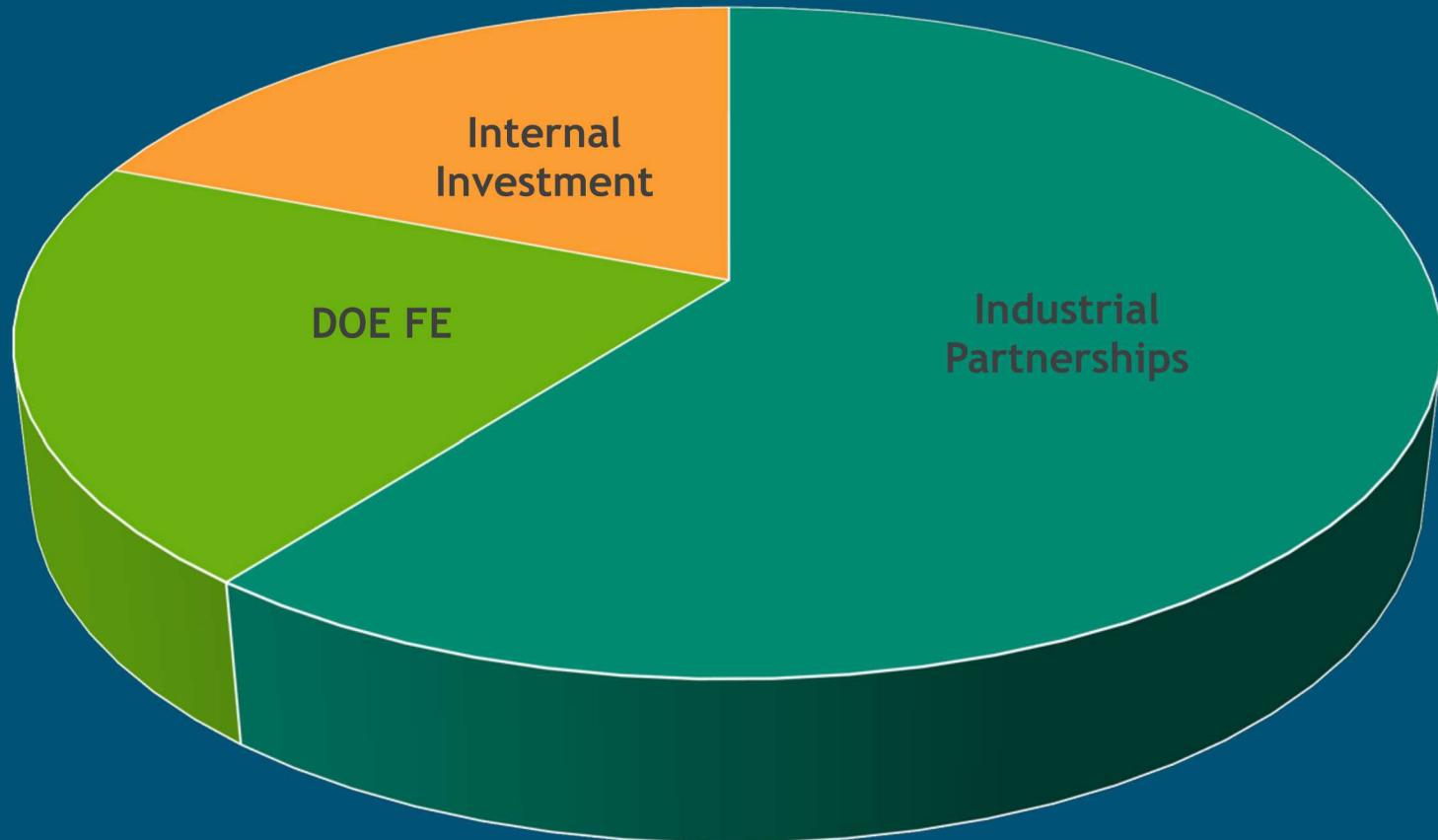
Sandia National Laboratories Oil & Gas Upstream Program Overview

Steve Vigil
Sandia Oil & Gas Upstream Program Manager

Sandia Fossil Energy Program Structure and Earth Science Research and Applications Group

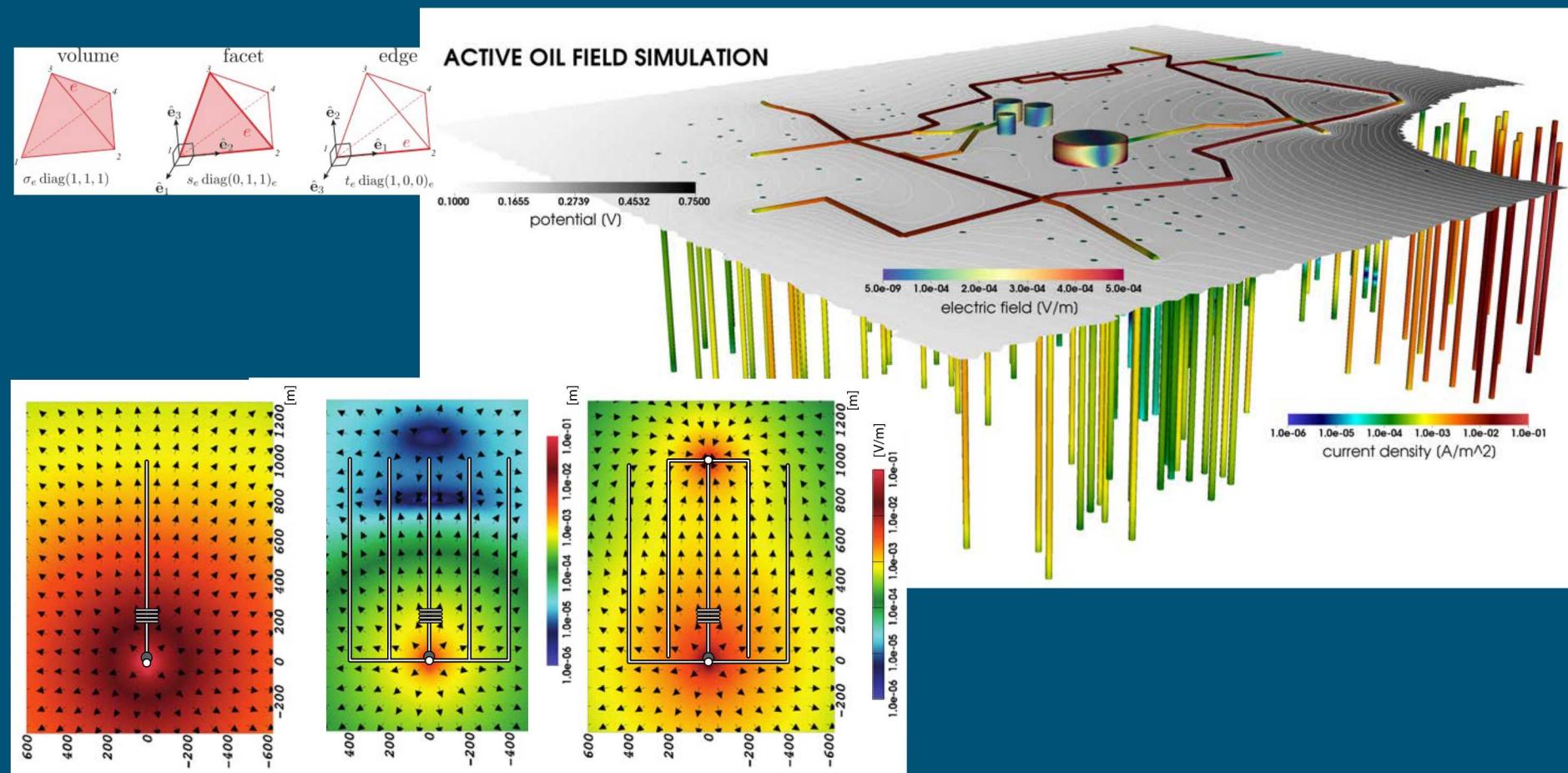


Oil & Gas Upstream Portfolio





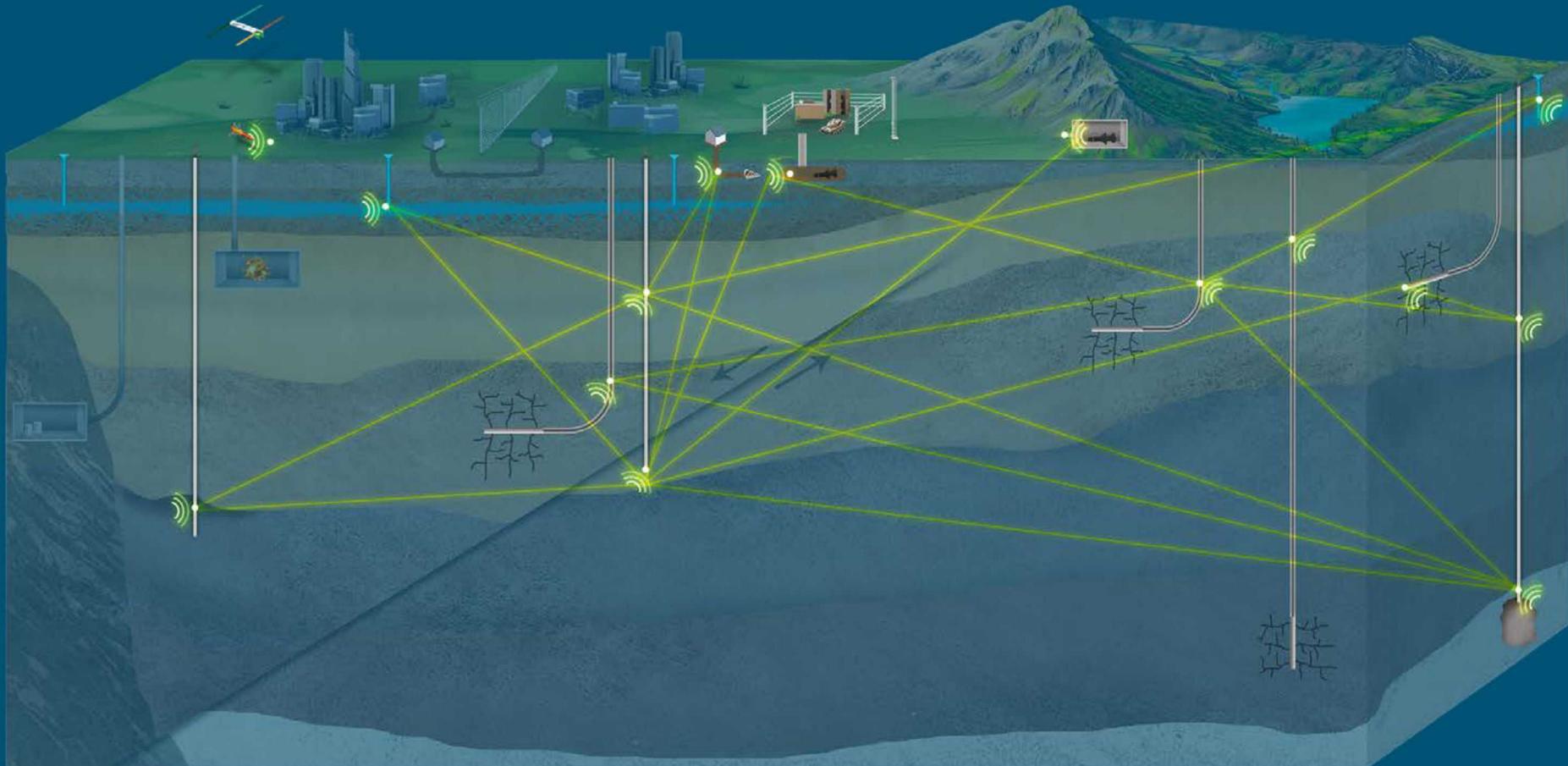
Prediction and Inference of Multi-scale Electrical Properties of Geomaterials



Successful algorithmic implementation of a conceptual breakthrough has opened a new world of fast, high-fidelity oil field modeling for electromagnetic detection methods.



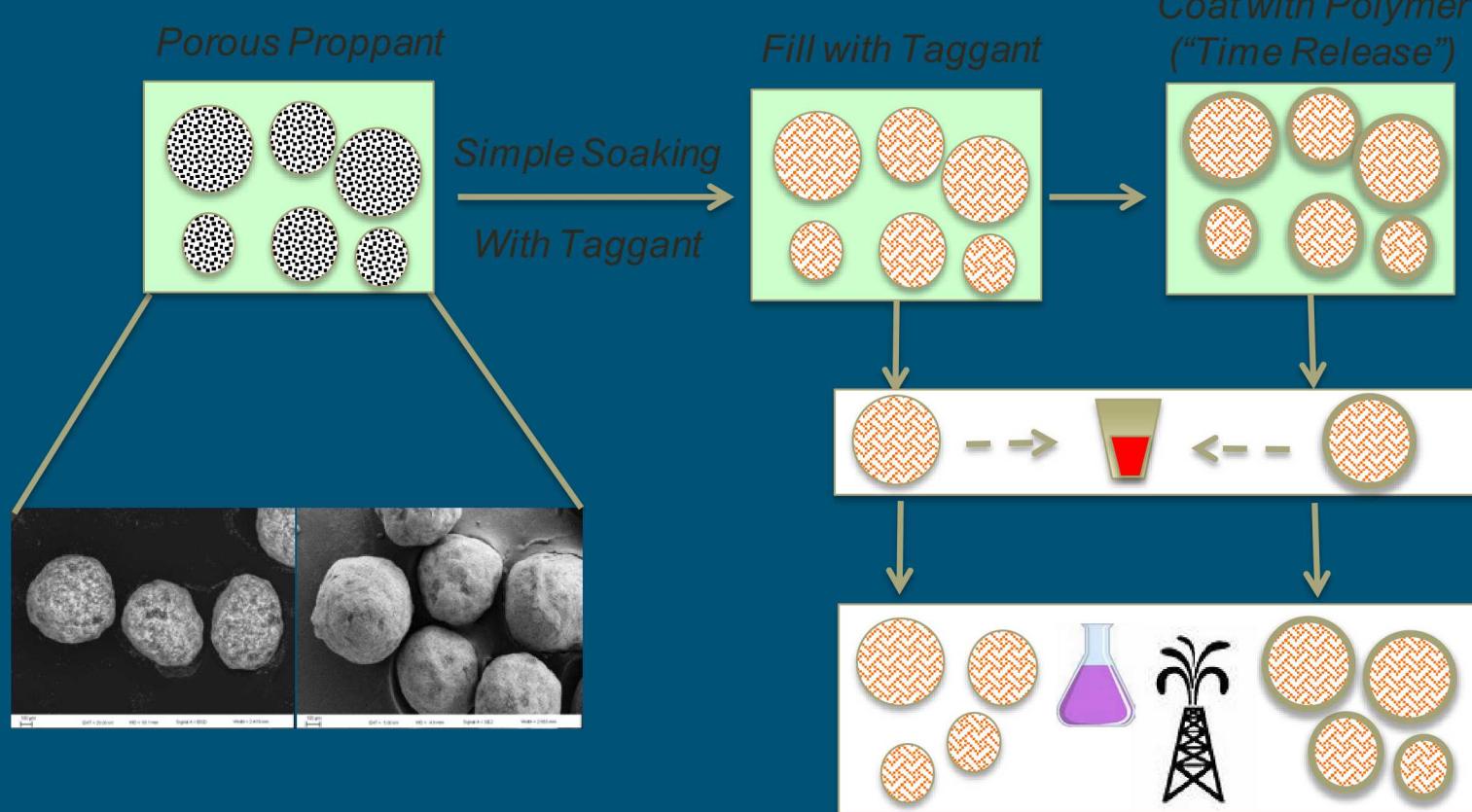
ReSeaD : Real-time Subsurface event assessment and Detection



Improved production field realtime situational awareness via novel subsurface sensors and signal processing.



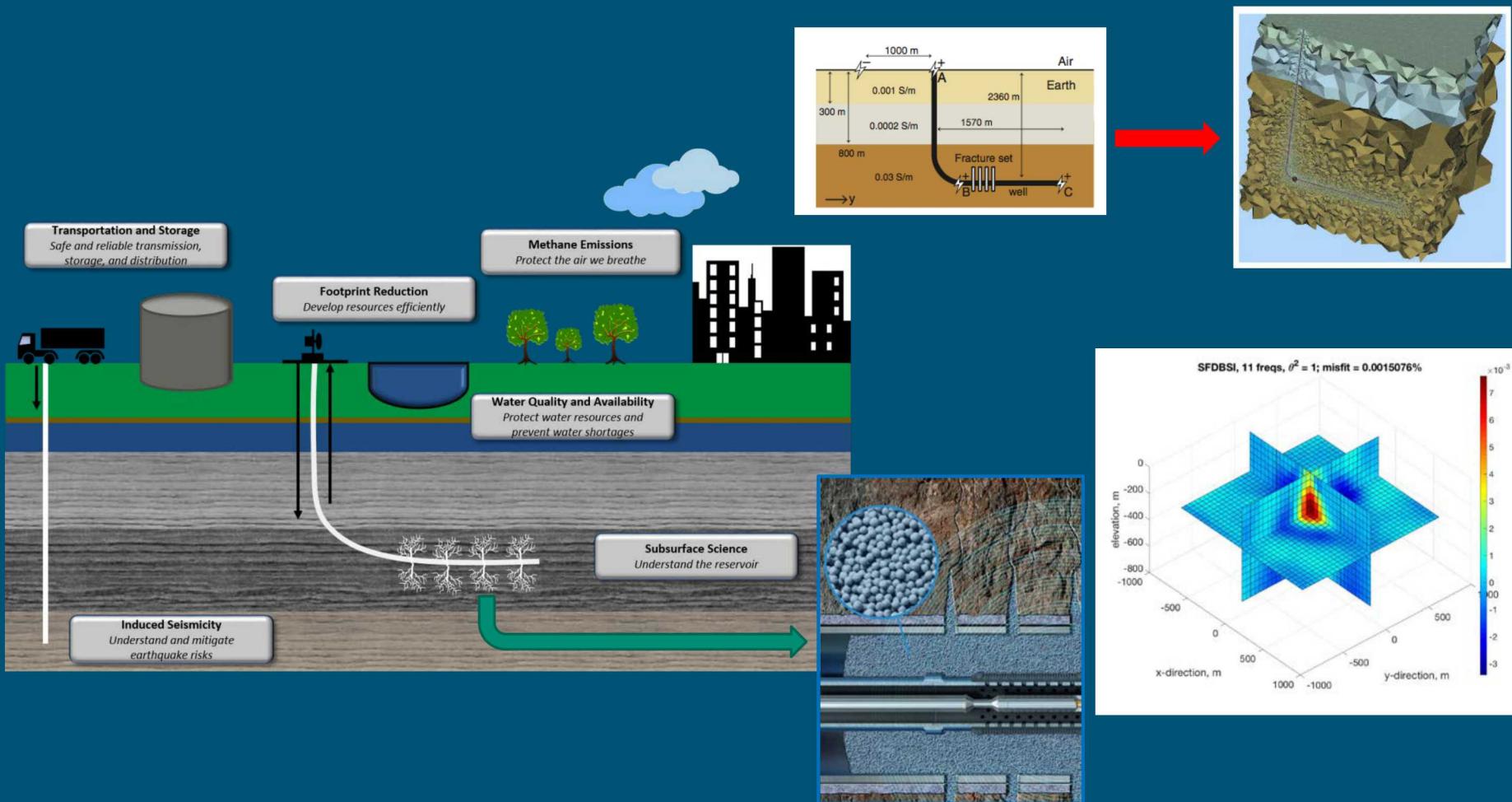
Detection of Soluble Ligand-Tuned Molecular Tags for Subterranean Fluid Flow Monitoring Using Resonance Raman Spectroscopy



Library of uniquely identifiable molecular tags; timed release from porous proppants can extend monitoring of injected fluid flows from 1-2 months to 1+ years.

Upstream Portfolio Overview

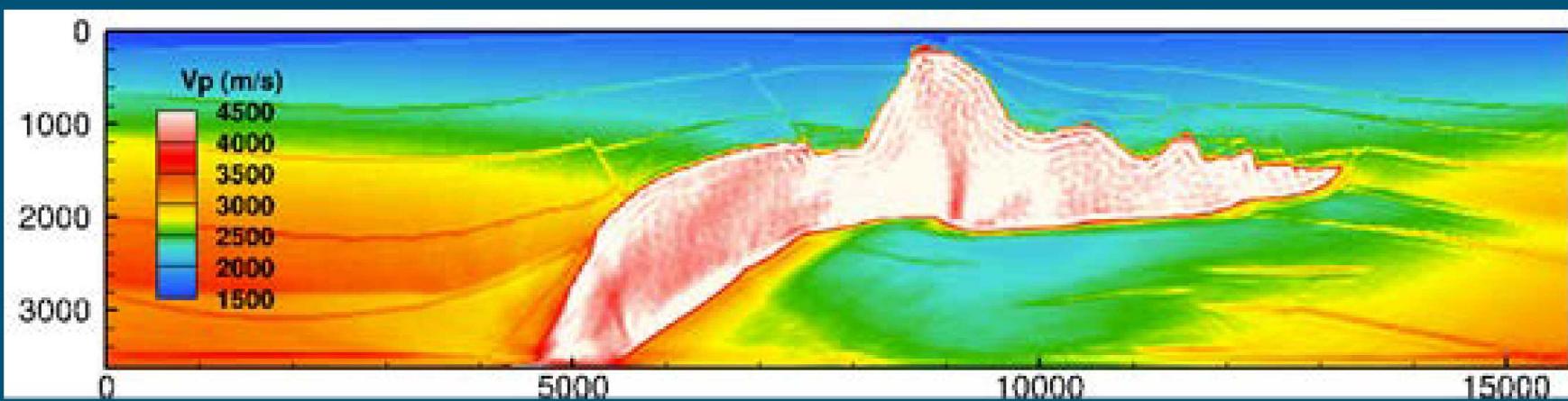
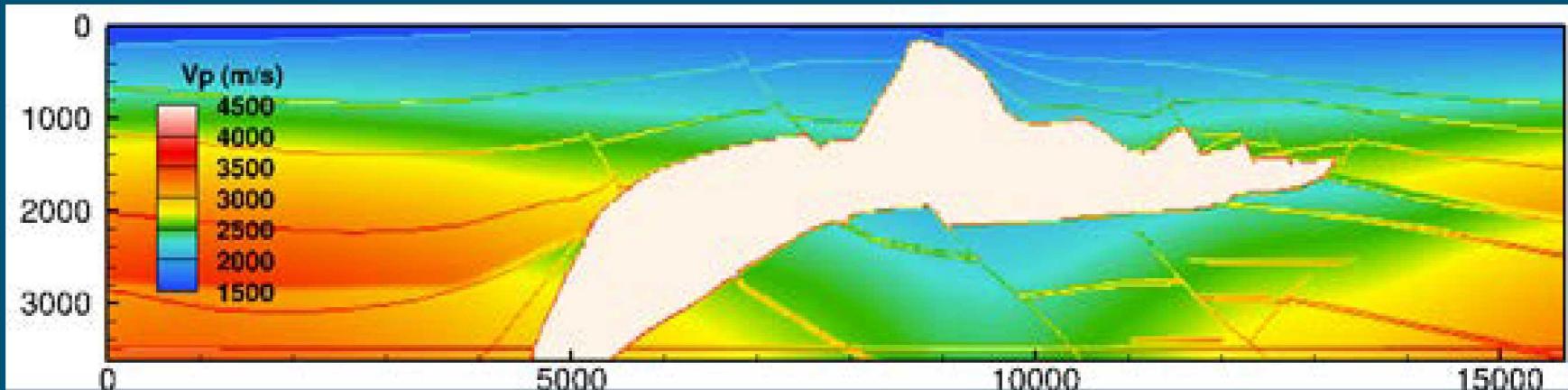
Industrial Partnerships



Sandia modeling and simulation expertise is helping an industrial partner develop products to locate proppant using EM methods.

Upstream Portfolio Overview

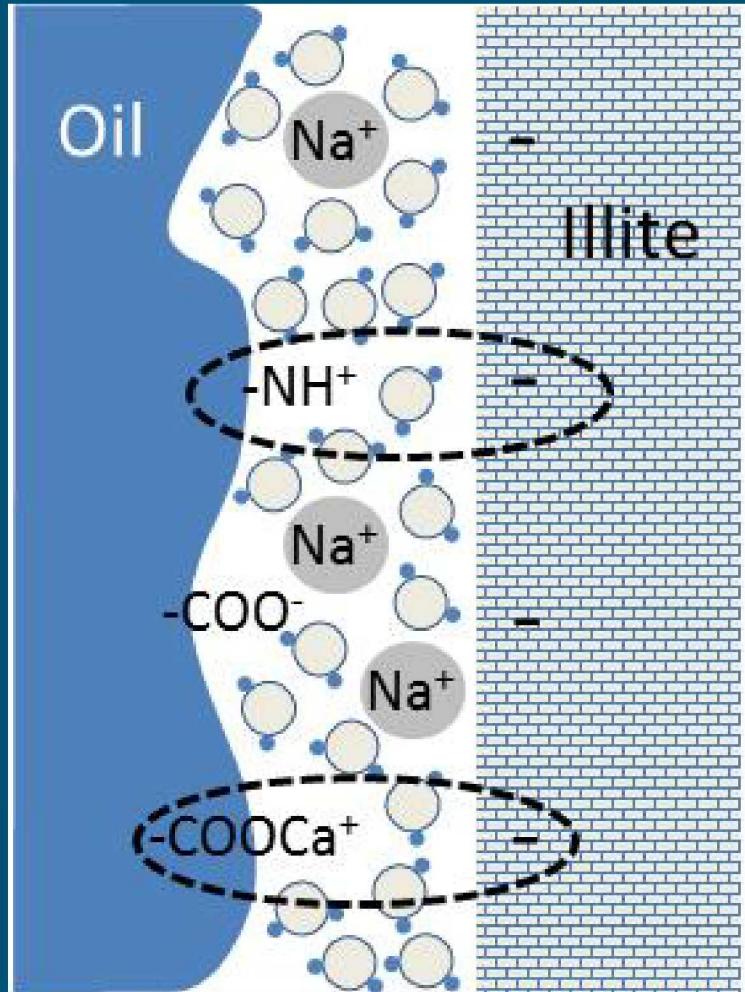
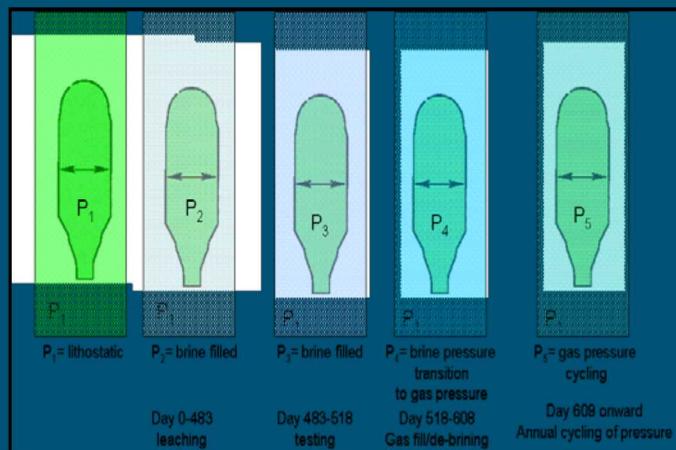
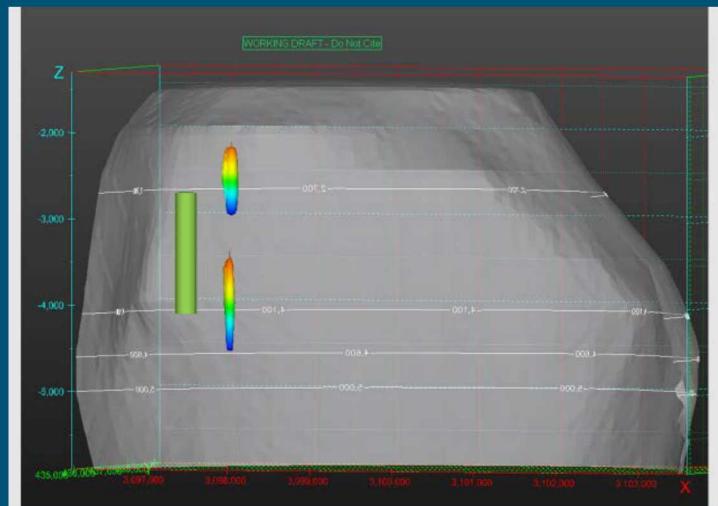
Industrial Partnerships



Sandia high-performance computing capabilities and advanced seismic wave propagation modeling are helping reduce exploration risk by producing more accurate earth models.

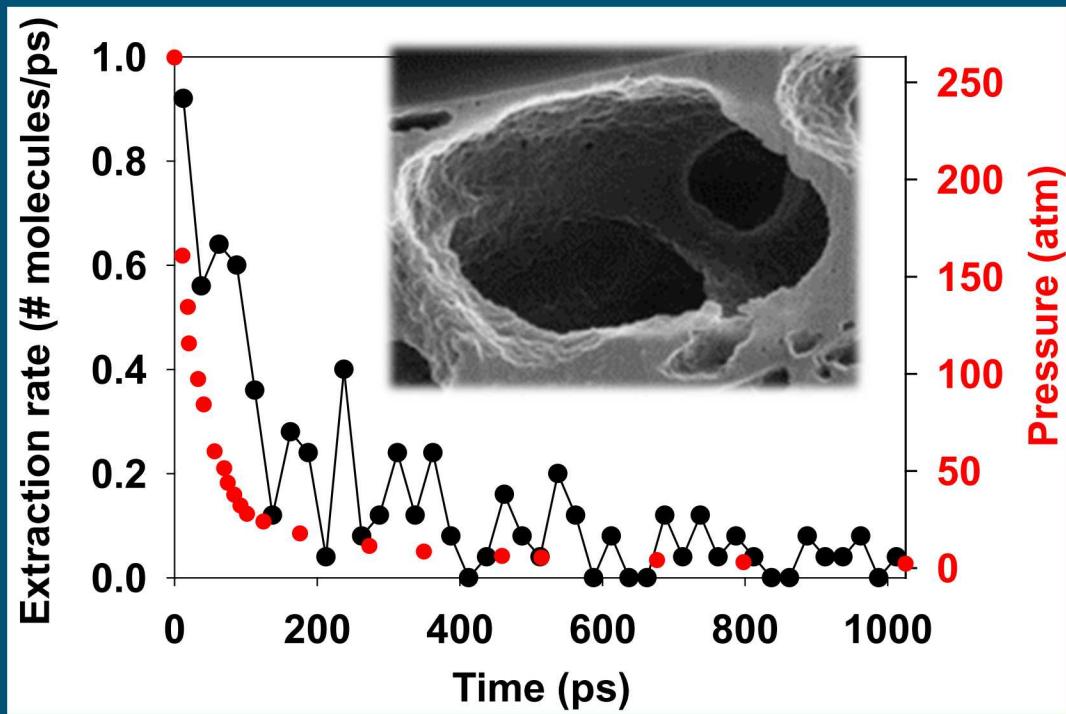
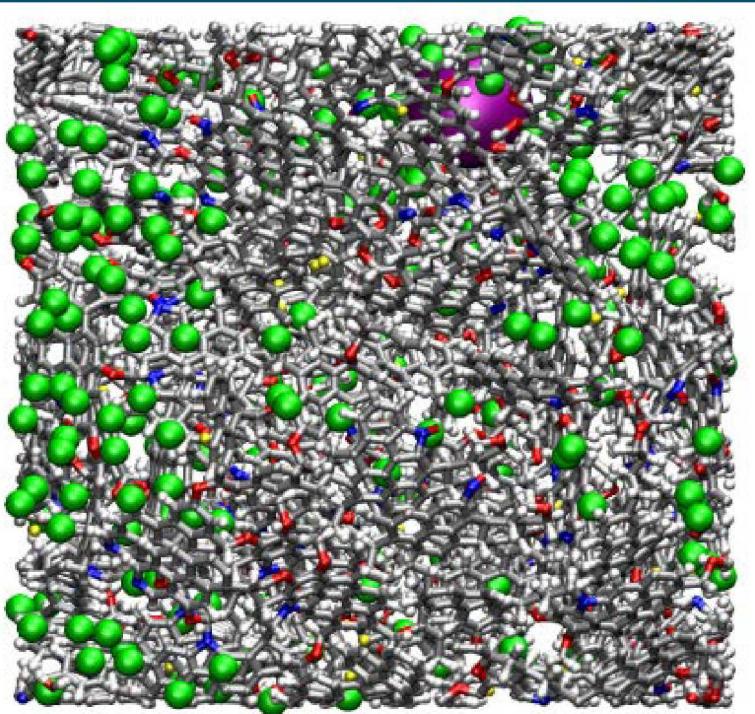
Upstream Portfolio Overview

Industrial Partnerships



Sandia's Sierra software and salt geomechanics expertise is helping with high-volume hydrogen storage.

Sandia geochemistry expertise is pioneering EOR from tight formations by optimizing the composition of fracking fluids

Fundamental Understanding of CH₄-CO₂-H₂O Interactions in Shale Nanopores under Reservoir Conditions

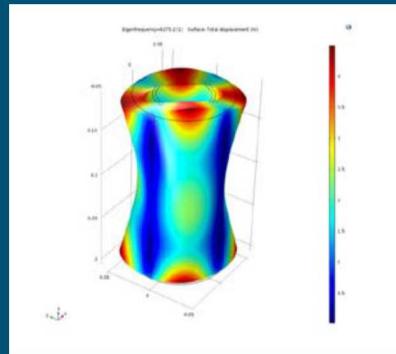
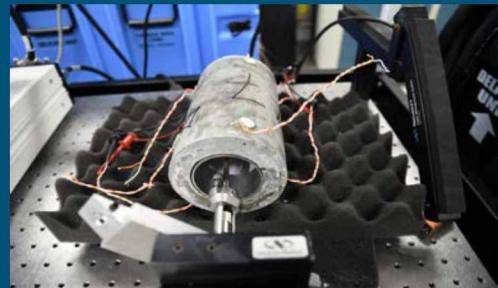
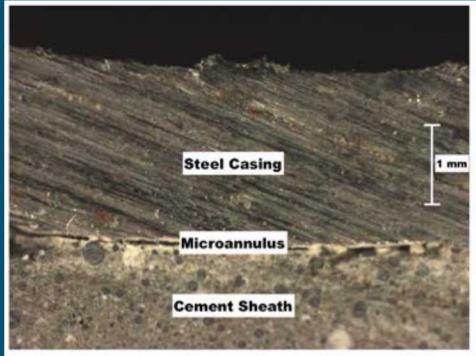
Sandia computational modeling results and lab measurements are elucidating potential mechanisms for shale well production decline and indicate that existing kerogen models are inadequate and need further refinement.

Upstream Portfolio Overview

Wellbore Integrity and EOR CO_2 sequestration

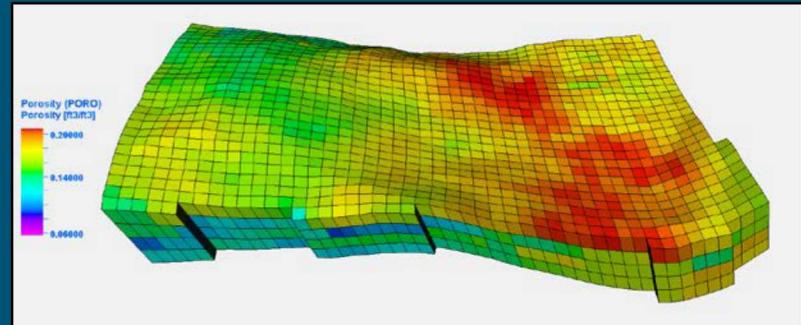
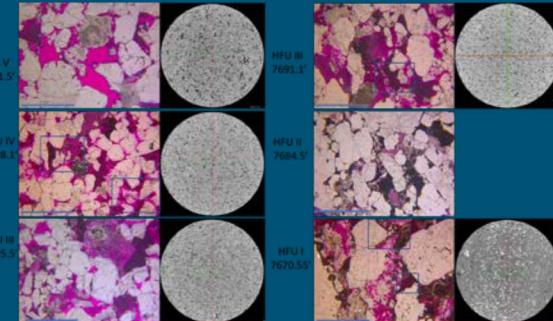


Nonlinear Acoustic Methods for Characterizing Wellbore Integrity



Development of a novel method for behind-casing flaw detection.

EOR CO_2 Sequestration



Construction of geo-models that use laboratory pore-scale and relative permeability data results in better match to field scale production behavior.

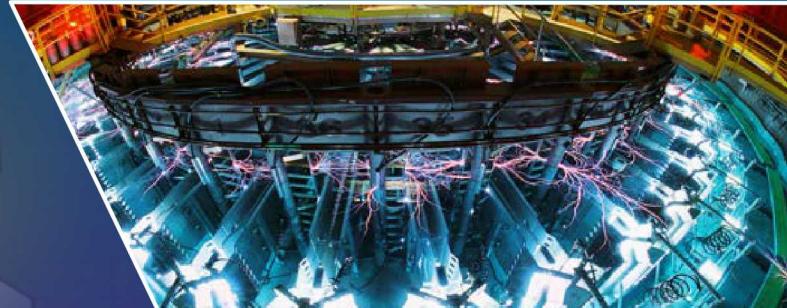


Research Foundations play an integral role in mission delivery

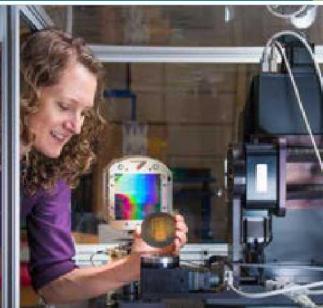
Nanodevices & Microsystems



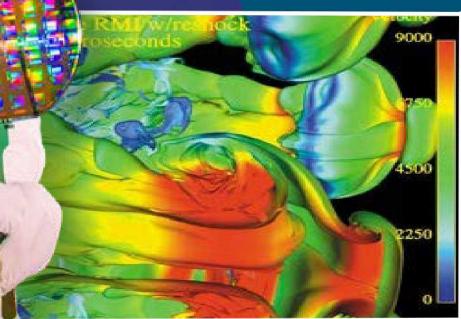
Computing & Information Science



Radiation Effects & High Energy Density Science



Materials Science



Engineering Science

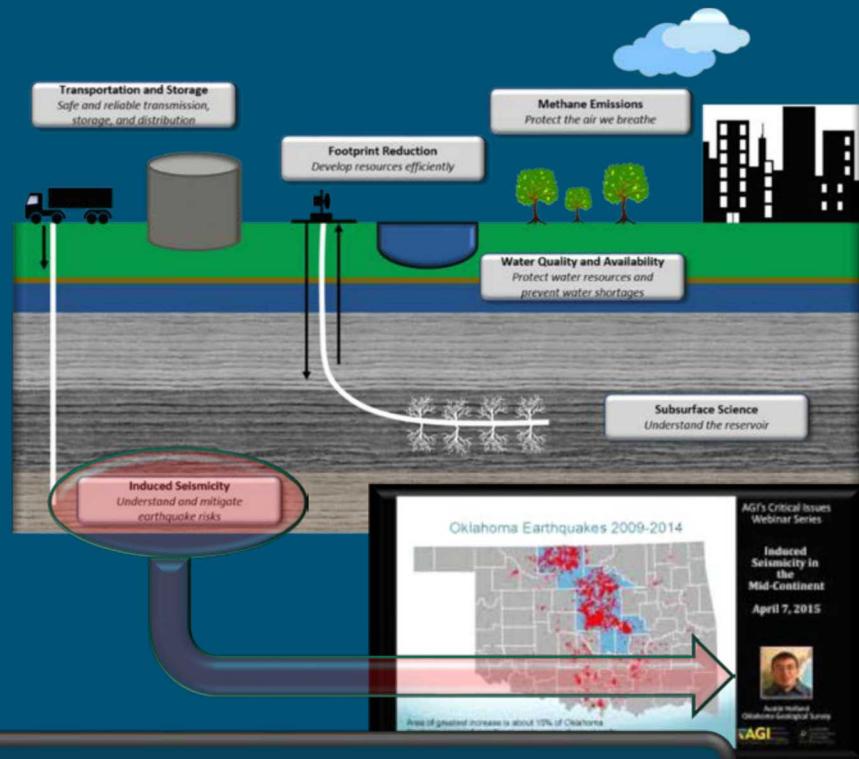


Geoscience



Bioscience

Future Directions



MLDL

