FY19 Ending Earth Science LDRD Updates

Erik K. Webb and Tracy Woolever

- **_Integrated Geomechanics and Geophysics in Induced Seismicity: Mechanisms and Monitoring, Hongkyu Yoon, PI, FY17 – FY19_**

  - Refined hydro-mechanical modeling of injection-induced seismicity in the multiphase flow systems and the effect of mineral orientation on roughness and toughness of Mode I fractures, in additively manufactured Anisotropic Rocks
  - Translated the Micro-scale to Macro-Scale Signatures of Fracture Evolution

- **_Monitoring and Repair of Damaged Cement-Geomaterial Interfaces in High Pressure High Temperature Repository and Borehole Scenarios, Ed Matteo, PI, FY17 – FY19_**

  - Developed experimental and computational tools to study fundamental science questions related to failure at cement-geomaterial interfaces which resulted in a better understanding of chemo-mechanical coupling
  - Generated IP in the area of wellbore seal repair materials in collaboration with University of New Mexico

- **_Attribution of Methane Emissions in the Arctic and Continental US, Ray Bambha, PI, FY17 – FY19_**

  - Developed a framework to compute and update in a Bayesian framework for multiple field based emissions (modeled as stochastic random fields), simultaneously for several sectors.

- **_Prediction and Inference of Multi-scale Electrical Properties of Geomaterials, Chet Weiss, PI, FY17 – FY19_**

  - Grid Structures of EM Models
  - Fractural Calculus with extensions for physically rigorous reduced-order flow models of fractured subsurface environments without explosive computational cost

- **_Unlocking Real Time Infrasound Classification Abilities Using Machine Learning, Sarah Albert, PI, FY18 – FY19_**

  - Benchmarked current and emerging approaches to infrasound signal classification which resulted in new work to investigate the possibility of predicting atmospheric structure for infrasound propagation using machine learning