

Bay Area Geophysical Society Seminar Series



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Integration of lab- and field-scale Rock Mechanics measurements for Geologic Carbon Storage

Dr. Roman Makhnenko

Assistant Professor, Department of Civil and Environmental Engineering, the University of Illinois at Urbana-Champaign

**December 21st, 2023, 12.30 PM PST –
Virtual Lunch Talk on [Zoom](#)**

Abstract:

Preliminary analysis of the risks associated with on-going geologic carbon storage projects has to be conducted in conditions of limited knowledge about the participating rock formations to assess the feasibility of the potential injection site. Different sources of geomechanical data, e.g., geophysical well logging and laboratory testing, are utilized to initialize numerical models for the preliminary assessment. Both data sources are associated with intrinsic limitations, increasing the uncertainty in the model prediction. For example, accurate assessment based on advanced constitutive models requires thorough and prolonged laboratory characterization. One of the appealing opportunities is to utilize parameters estimated through empirical correlations for the geophysical data collected during well logging. While this approach is highly beneficial at the initial stages of assessment, these estimations have significant discrepancies and cannot address the sensitivity to the evolution of the stress state during the injection of CO₂. Moreover, the poromechanical properties

depend not only on the rock type but also on the pore fluid. This fact cannot be addressed during the simplified approach, highlighting the need for accurate laboratory measurements at representative conditions in terms of the applied state of stress, temperature, and pore fluid composition.

Author:

Roman Makhnenko is an Assistant Professor in the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign. Roman has a background in mechanics and applied mathematics and he obtained his MS (2009) and PhD (2013) degrees in geological and civil engineering from the University of Minnesota – Twin Cities. From 2013 to 2016, Dr. Makhnenko worked as a postdoctoral researcher and lecturer at the



Swiss Federal Institute of Technology in Lausanne (EPFL, Switzerland) on the project related to assessment of geological storage of CO₂. Currently, Roman is developing a rock mechanics program at Illinois that includes modern high-pressure/high-temperature rock testing facilities and new graduate and undergraduate courses on the topic. His group is working on the geomechanical testing and modeling for geo-energy projects such as CO₂ and H₂ storage and shallow geothermal systems.

Zoom meeting information:

Zoom ID: 826 1212 2120

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