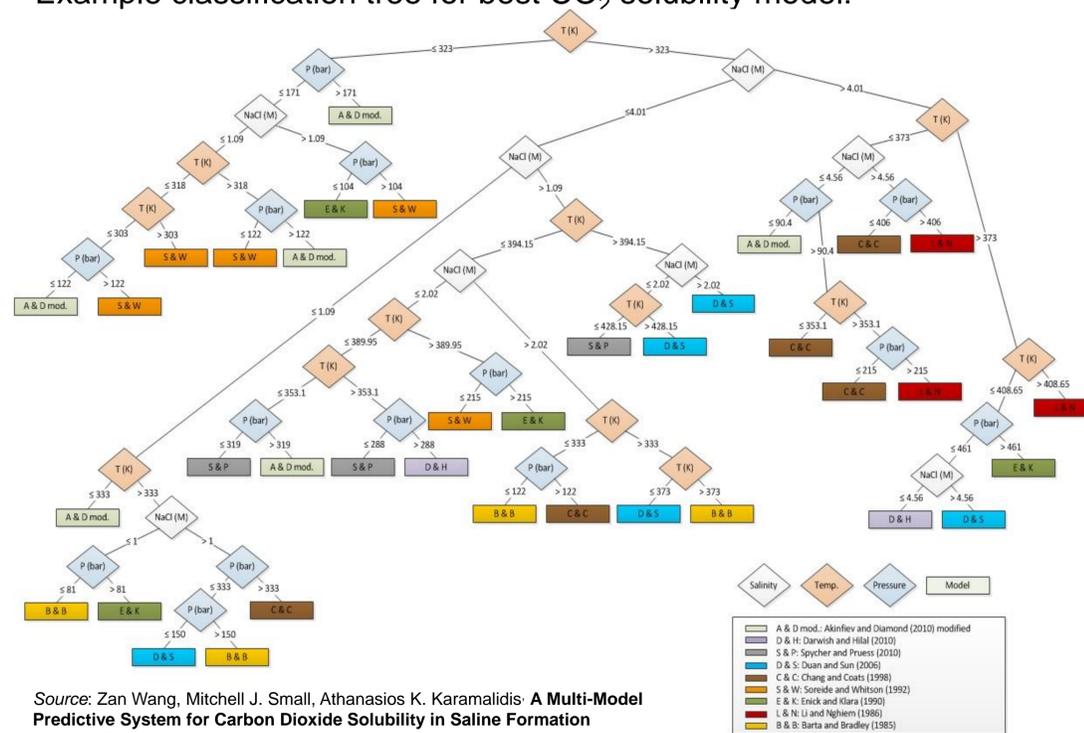


Challenge

- Carbon sequestration is a technological response to the continued use of fossil fuels while addressing the impact of green house gases
- Many models developed for the calculation of the solubility of these gases in waters are used arbitrarily based on their popularity. Some introduce a significant error in calculations because they are used for a variety of conditions for which are not performing well
- We need to improve our ability to understand and predict reservoir chemistry and improve storage capacity and cost estimates

Technology/Capability Overview

- The prediction of carbon dioxide (or other gas) solubility in brine or other aqueous media at conditions relevant to carbon sequestration, EOR operations or shale gas development, i.e. high temperature, pressure and salt concentration (T-P-X), is crucial when these technologies are applied
- A computer program that integrates many model predictive systems to calculate solubility of different gases in a subsurface formation waters
- Example classification tree for best CO₂ solubility model:



Source: Zan Wang, Mitchell J. Small, Athanasios K. Karamalidis: A Multi-Model Predictive System for Carbon Dioxide Solubility in Saline Formation Waters, *Environmental Science & Technology*, 2012 (under review)

Industry Significance

- Enables industrial users to access multiple sub-models for various reservoir conditions and to predict the best-performing model for those conditions
- Ensures that estimates are based on the most advanced methods from statistics and machine learning
- The final product will greatly increase the capabilities and accuracy of Reduced Order Models for EOR and Shale gas production and CO₂ storage estimates by providing improved estimates of model inputs and relationships, decreasing the uncertainty of cost projections for these technologies

Benefits to Partner

- Product will be utilized across multiple programs, with both scientific and applied benefits
- Relatively low budget project, requiring computational, rather than experimental, resources

Opportunity

- Seeking company to purchase or license the innovation for use in CCS, EOR or Shale gas applications
- Seeking company to develop and market a user-friendly computer platform for the program

Development Status

- The MMoPS for CO₂ solubility in brines for CCS has been developed and described in a peer-reviewed journal paper
- The MMoPS for CH₄ and other gases solubility in water for shale gas development and EOR is under development

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