

Developing a National Structural Complexity Database for U.S. Saline Basins

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Research & Innovation Center



Problem:

- Lack of information to better understand the influence structural complexity will have on long-term carbon storage security. No comprehensive database exists to assess potential subsurface CO₂ storage and migration pathway hazards.

Objective:

- Produce structural complexity (SC) estimates within deep saline basins based on known and inferred structural elements (e.g., faults, fractures, etc.) for use in risk models and decision making for current and future carbon storage projects.

Methods:

- Produce datasets for selected saline basins representing:
 - Existing, known SC (currently completed)
 - Predicted potential unknown SC
- Leverage fuzzy logic-based method outlined in Justman et al. (2020)
- Assemble and integrate results into a unified database for use in carbon storage-based assessments

Ultimate Product:

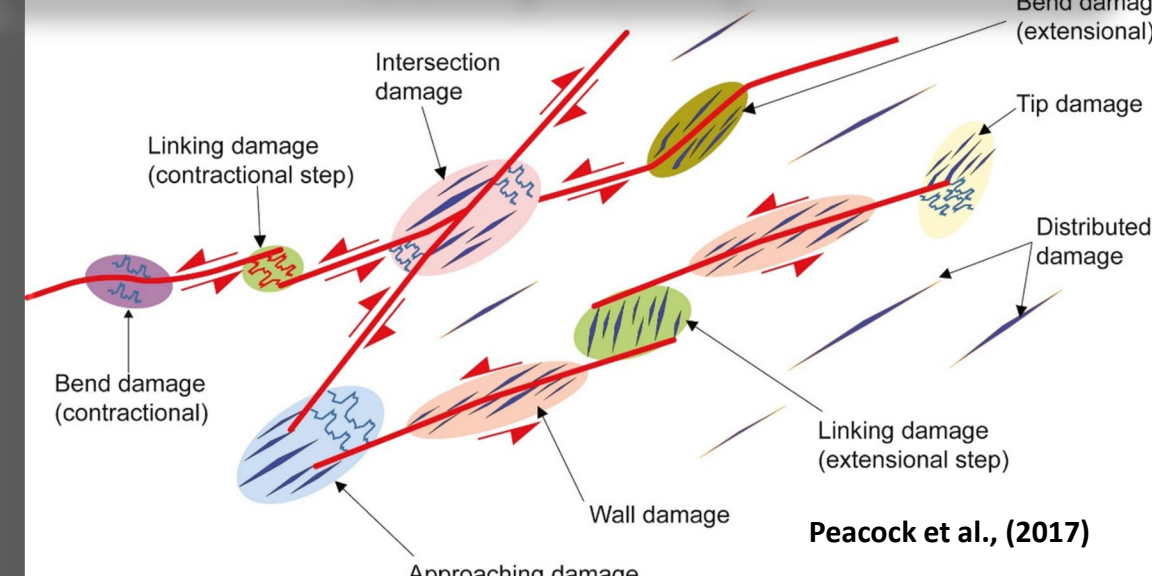
- A series of raster-based datasets organized by basin
- A database of structural complexity estimates for selected deep saline basins hosted on the EDX DisCO₂ver platform
- Including key metadata
 - Data catalog
 - ReadMe file explaining SC analyses and results
 - Source datasets used for analyses
- Available on EDX DisCO₂ver Platform in March 2024

Current Status:

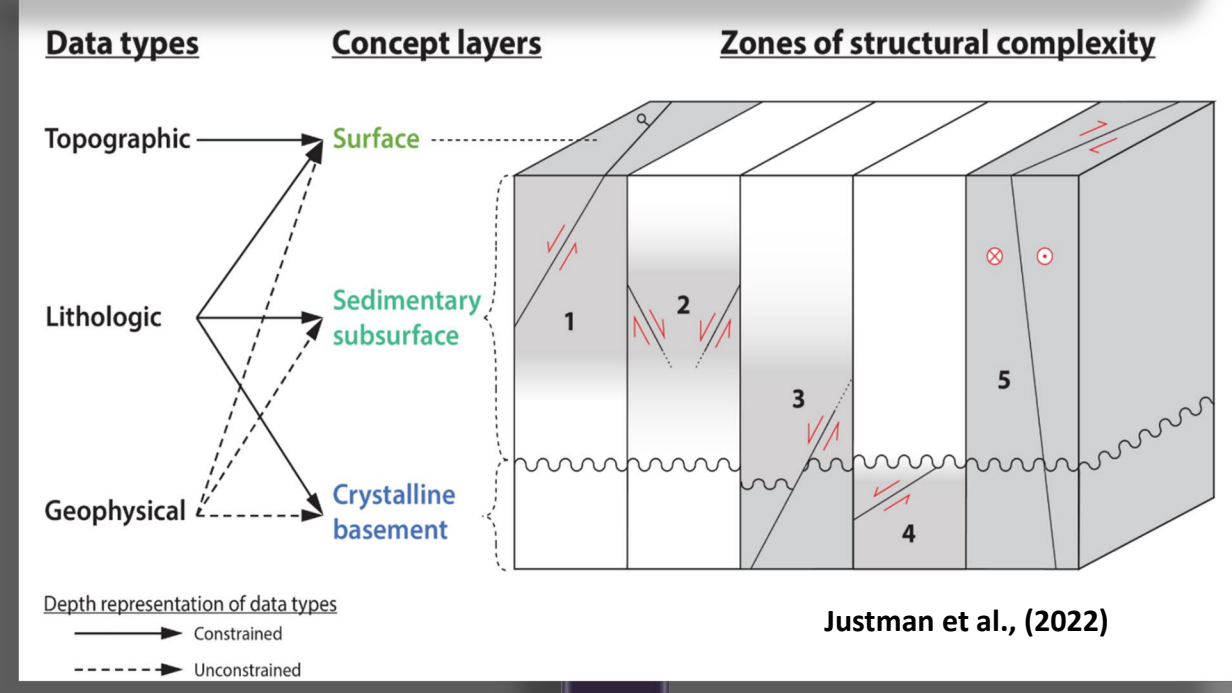
- Selected seven candidate saline basins for analysis
- Developed 151 datasets representing known structural complexity
- Developed processing tools to streamline and rapidly iterate outputs as needed

Workflow:

Modeling Known Structural Complexity



Predicting Structural Complexity



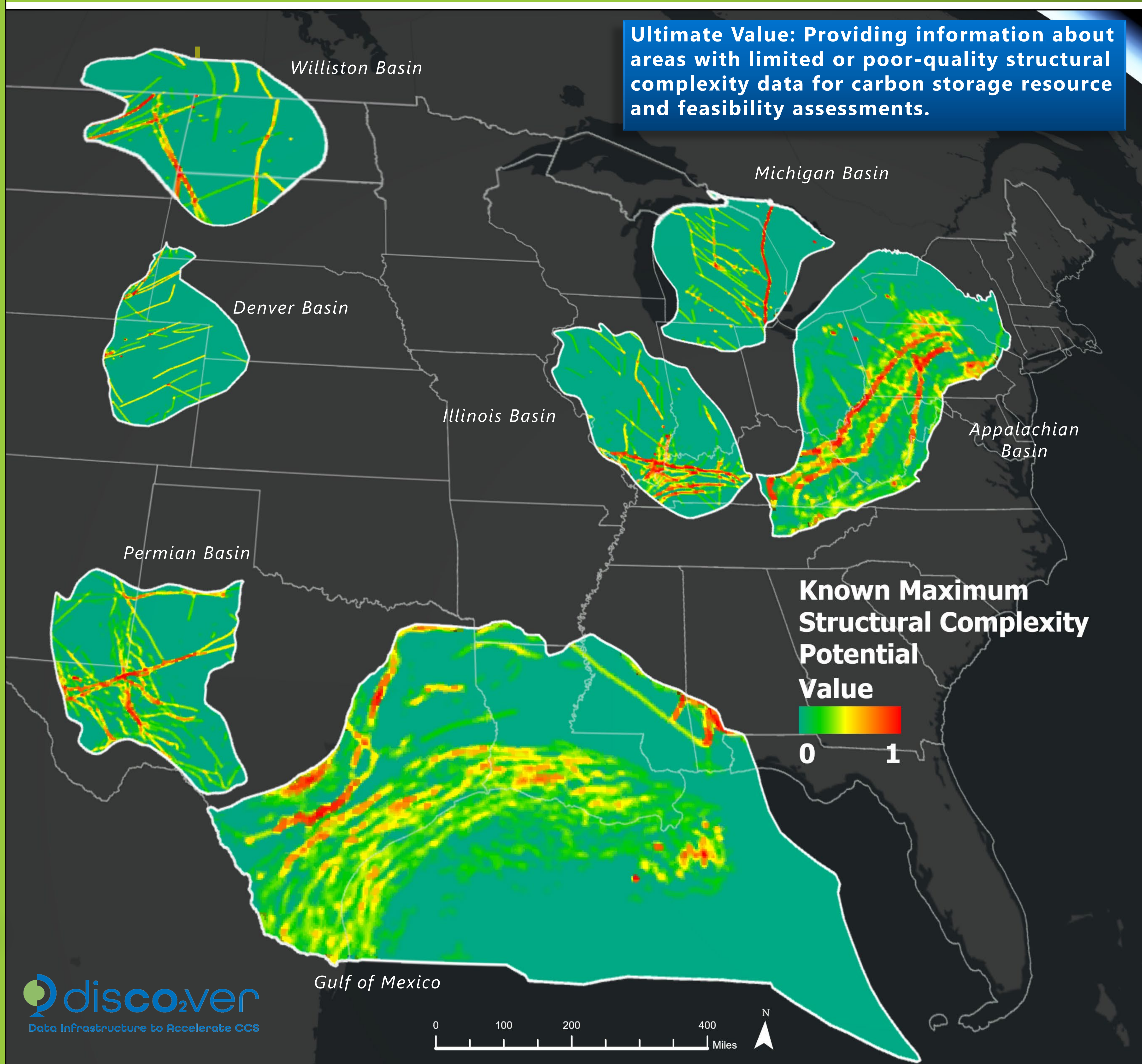
National Structural Complexity Database

- Appalachian Basin
- Denver Basin
- Gulf of Mexico Basin
- Illinois Basin
- Michigan Basin
- Permian Basin
- Williston Basin
- Data catalog.xlsx
- ReadMe.docx
- Source datasets.xlsx

Next steps:

- Develop tools and workflows to predict structural complexity
- Opportunities to assist stakeholders with the identification of CCS hazards and data gaps that may require additional future work

Ultimate Value: Providing information about areas with limited or poor-quality structural complexity data for carbon storage resource and feasibility assessments.



Disclaimer:
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