

Salt Domes, the Energy Transition, and a 21st Century Geospatial Database

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Abstract

Salt domes comprise an integral chapter in the story of Texas's economic and energy development. They are sources of halite, potash, and sulfur, and it was the 1901 oil strike at the Spindletop Salt Dome that ushered in the oil age in Texas. More recently, man-made caverns within salt domes have been used to store a wide variety of waste, hydrocarbons, and other products, and two domes in Texas store more than half our nation's strategic petroleum reserves. Because of these constituent interests, salt dome research in Texas flourished in the 1970s through the early- to mid-1980s at which time various studies, compilations, atlases, and spatial databases were compiled and published. However, since that time published research has tapered off and a state-wide twenty-first century digital spatial database of Texas salt structures does not exist.

However, the energy transition and salt domes' potential for hydrogen and energy storage in general have revitalized interest in these geologic features. The Bureau of Economic Geology — with support from the State of Texas Advanced Resource Recovery (STARR) program and the U.S. Geological Survey — is engaged in a project to build a comprehensive geospatial database including every onshore salt dome in Texas. Where available, salt and caprock structure contours from peer-reviewed publications are digitized and annotated; elsewhere, we are generating structure contours from available published data including cross sections, well logs, and descriptions. Python is employed to assemble disparate datasets into a single, versionable geospatial database, automate TIN generation, and export three dimensional salt body objects for web-based interactive 3D visualization and analysis. These tools and data will help our team's research efforts in estimating hydrogen storage capacities, understanding the operational conditions for the purposes of heat and power generation, and advancing our general knowledge of salt domes.