Fall 2024 GRG460 Environmental GIS

Geologic Framework and Accessibility of Critical Mineral Zones in Texas

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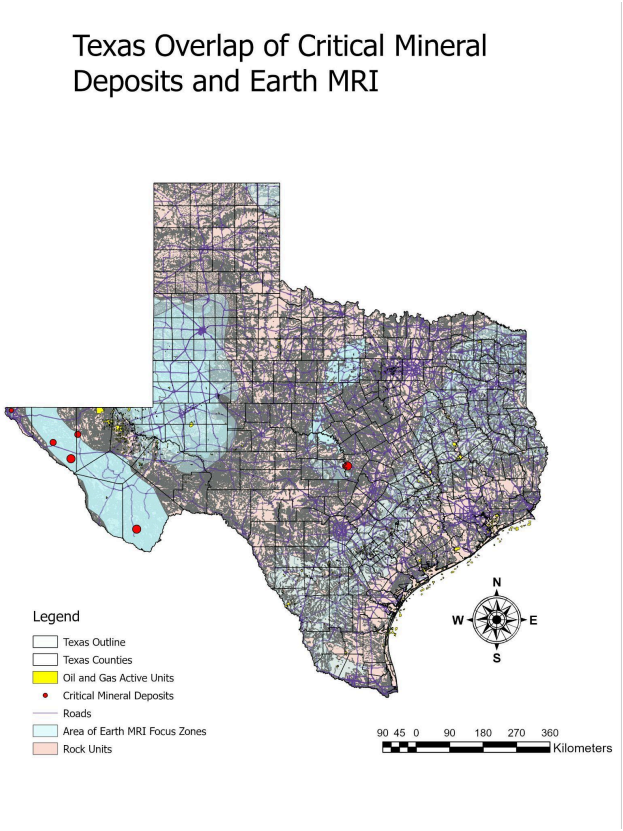

Abstract

This project examines the spatial relationships among critical mineral deposits, Earth MRI focus areas, geological units, major roads, and the application of ArcGIS. The objective is to identify where favorable geologic formations, USGS-identified mineral-prospective zones, and accessible infrastructure come together to create a region of high exploration potential. Using vector based spatial analysis techniques including buffering, clipping, intersection, proximity calculations, and spatial joins we integrated data sets from the Texas National Resource information system (TNRIS), The US Geological Survey USGS, The US census tiger slash line program, and Texas general land office GL O. Results show that mineral prospective zones intersect with specific geological formations in West TX and that most deposits occur within proximity to major roads, suggesting favorable accessibility points. The findings demonstrate how GIS based spatial analysis can support a mineral resource evaluation and land use planning by identifying intersections between geology, infrastructure, and energy development.