

Neodymium Isotope and Ree Constraints on Paleozoic Sediment Dispersal to the Fort Worth Basin

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ABSTRACT

Despite the fact that the Fort Worth basin in east-central Texas is a major petroleum producing system in the North America, sediment dispersal patterns and their influences on hydrocarbon enrichment in the basin are not well constrained. Siliciclastic grains within the upper Paleozoic strata in the Fort Worth basin were proposed to be derived from basin-bounding local sources including the Muenster uplift and Ouachita orogeny, or distal source of the Appalachians, or both. These hypotheses cannot be tested using detrital zircon geochronology because of the high abundance of mudstone and carbonate in most part of the Paleozoic strata, and because that the high fertility of Grenvillian zircon in sediment recycling could be an artifact of Appalachian provenance. I propose to study Nd isotope and rare-earth element (REE) compositions of Paleozoic mudstone samples in the Fort Worth basin in order to test the hypotheses of sediment provenance. By combining my data with published Nd isotope data in eastern and southern Laurentia, I will document any changes in sediment dispersal pattern and reconstruct paleogeography before and during the collision between Laurentia and Gondwana. Local sources of the Muenster uplift and Ouachita orogen should have low Nd (~ -15) and are enriched in light REE (LREE) because they are old or recycled continental crust. Distal source of the Appalachian highland should have relatively high Nd (~ -7 to -10) and are and is less enriched in LREE reflecting the juvenile arc terrenes.