Samples from several cores from the late Pennsylvanian Cline Shale and an age equivalent unit have been examined to determine what pore systems are present. All mudrock samples have a mix of organic-matter, intraparticle, and interparticle pores. Development and mix of pore types varies greatly from sample to sample. However, overall the Cline Shale samples contain dominantly organic-matter pores. The most porous samples have the best developed organic-matter pores. The samples from the age-equivalent unit have few organic-matter pores and are dominated by intraparticle pores, to the extent that they have pores.

Problem and Objective

The nature and origin of pores in mudrocks are incompletely understood. Advances in technology have enhanced the direct imaging of mudrock pores (e.g. Loucks and others, 2009). The objective of this study was to characterize the pore systems (Loucks and others, 2012) of a set of samples from three cores in the late Pennsylvanian Cline Shale of the Midland Basin and one core in mudrocks that are age-equivalent to the Cline (Fig. 1).

Background

The Cline Shale of the Midland Basin, west Texas is an organic-rich mudrock unit up to 450 feet thick (Roush, 2015) that is also referred to as the “Wolfcamp D” (McGlue and others, 2015). The unit has been explored for hydrocarbon production (Skaar, 2012, Jacobs, 2013). The Cline occupies a stratigraphic position above the Strawn and below the Wolfcamp (Fig. 2). A micropaleontological study of conodonts and foraminifera (Wahlman and others, in prep.) indicates that the unit is late Pennsylvanian in age. Roush (2015) proposed a stratigraphic division of the unit into a thin lower Cline member, overlain by thicker middle and upper members.

Samples for BIB milling were obtained from four well cores (Fig. 1): the Amoco Bevers #1 well in Garza Co., the Gulf Glass B3 well in Martin Co., the Pan Am Powell #1 well in Glasscock Co., and the Pan Am O.L. Greer #2 well in Reagan Co. Three of these cores are in the Cline Shale itself, one of them (the Amoco Bevers #1) is in rocks age-equivalent to the Cline Shale from north of the Horseshoe Atoll (Fig. 1). Five BIB samples were taken from the Bevers #1 core. Six BIB samples were taken from the Glass B3 core, all from the Middle Cline. Five BIB samples were taken from the Powell #1 core, all from the Upper Cline. Three BIB samples were taken from the Greer #2 core, two of these are from the Upper Cline and one is from the Middle Cline. A lack of available core from the Lower Cline somewhat limited this study.