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## The English Basin, Kentucky: a seismic study of the relationship between a Proterozoic basin and subsequent Paleozoic structure and strata

The English Basin is interpreted as a Mesoproterozoic and Cambrian-age depocenter, forming a portion of the East Continent rift complex in areas of Kentucky and Indiana. Both proprietary and published seismic sections show a complex structural depocenter with a depth to crystalline basement exceeding 6100 m. Two boreholes penetrate the Proterozoic sequence of the depocenter and have strata similar in lithology to both the Precambrian Middle Run Formation (Centralia Group) described in Ohio and Kentucky and low-density clastic sediments of the overlying Marengo Formation.

A newly discovered thrust-fault system in the lowermost Mesoproterozoic Centralia Group is referred to as the Hoosier thrust belt and corresponds to the positions of overlying Paleozoic fault systems, pinnacle reefs, and shallow petroleum production. Above a major angular unconformity truncating Centralia strata, the newly described clastic sediments of the Marengo Formation are deposited locally within the English Basin.

The eastern basin margin is defined by the Louisville uplift, a 600 m.y. old foreland-style basement thrust with approximately 8 kilometers of uplift. Devonian shales at the margins of the uplift that are cut by a series of shallow fault systems are currently being developed as fractured reservoirs.

Extending north of the bounding feature is the Mt. Carmel uplift. Features interpreted on seismic data are flanking Proterozoic basins, forced folds, and complex faulting associated with gas storage fields and Ordovician oil production.

Petroleum fields along the margins of the basin appear to be associated with remobilization of bounding fault systems that have controlled the structural and stratigraphic development of the area.

Potential field data tied to regional seismic reconnaissance of the basin illustrate the lateral geometry of the basin and underlying thrust belt system. Epicenters of earthquakes recorded in the area may be localized along detachment structures within the Precambrian thrust belt, relating contemporary seismicity to the current east-west orientation of the principal maximum horizontal compressive stress along the Hoosier thrust belt.

### Biographical sketch

T. Joshua Stark received his B.S. in geology from the University of Missouri at Columbia in 1980. He began his oil field career as a mudlogger, working the Rockies, Williston and Permian basins. Since then, he has held positions with various companies working as a senior exploration geologist in the Illinois, Forest City, Appalachian, Michigan, Santa Maria, and San Joaquin basins, as well as mid-continent and international regions. Currently, Josh is a senior exploration geologist with Aurora Energy Ltd. of Tulsa, OK, where he is working the Illinois, Appalachian and Michigan basins. Josh received the A.I. Levorsen Award for his presentation regarding the tectonic history of northwestern Ohio at the 1998 AAPG Eastern Section Meeting. He is a member of the Indiana/Kentucky Geological Society and AAPG, and has authored or co-authored numerous publications on rift systems and the geology of the midwest. □