include delta distributary sandstones and interdistributary bar-fill shales, siltstones, and sandstones. One distributary channel sandstone body displays a "shoestring" geometry, over 12 mi (19.2 km) long and 1 mi (1.6 km) wide, with an average maximum thickness of 200 ft (61 m). This sandstone rests directly on and locally replaces the Lower Hartshorne coal bed. Three major mining problems are related to this sandstone body: (1) the Hartshorne sandstone in this area is a natural gas reservoir which might emit gas into adjacent coal mines; (2) the sandstone body is directly related to local discontinuities and rolls in the Lower Hartshorne coal bed; and (3) an unstable roof may be locally associated with trough cross-bedding and jointing near the base of the sandstone, and with facies changes and slickensides along the lateral margins of the sandstone body.

In contrast to this sandstone body, interdistributary bay deposits, because of their relative homogeneity and lateral persistence, do not present potential facies-related mining problems. Potential mining problems associated with these facies are local and are directly related to structural and stress-release features which are difficult to predict in advance of mining.

To insure safe and economic coal production from the Hartshorne formation, the distribution of major sandstone bodies overlying the coal beds must be considered when planning degasification programs and shaft, slope, and main entry locations.

HOWARD, JAMES J., State Univ. New York at Binghamton, Binghamton, NY

Sedimentation Rates and Illite-Smectite Diagenesis

The percentage of expansible smectite layers in a mixed-layer illite-smectite (I/S) clay has been correlated often with temperatures in a sedimentary basin. Sequences in Tertiary Gulf Coast sediments demonstrate that sediment accumulation rates exert a great influence upon I/S expansibilities by influencing thermal history. In sediment piles with high accumulation rates, the greater redistribution of energy produced by increased forced migration of fluids results in lower temperatures and thermal gradients and, as a consequence, the I/S clays are expected to react toward illite at slower rates. I/S clays from deltaic Wilcox (Eocene) shales have 50% expansible layers, in contrast to 25% expansible layers in I/S clays in marginal shelf Wilcox sediments found at similar present-day burial depths and temperatures. The more expansible I/S assemblages in the rapidly accumulating deltaic sediments are consistent with the predictions of energy transport theory in compacting sediments. As these Eocene I/S clays are now being buried under roughly equal thicknesses of sediment at similar rates, the difference in thermal gradient imposed by the original deltaic and shelf margin Wilcox sedimentation is being slowly reduced until both paleogeographic areas have roughly equal geothermal gradients. At similar present-day temperatures around 100°C, the important consideration is that the I/S clays in the slowly deposited shelf margin sediments reached the minimum reaction temperature before the clays deposited at the same time in deltaic sediments. Implication for I/S diagenesis is that the maximum temperature encountered is not as important as the rate at which minimum reaction activation temperatures in the basin are achieved, and that use of expansibility changes in I/S clays as a geothermometer needs to be reevaluated.

HOWE, HERBERT J., Purdue Univ., West Lafayette, IN

Delineation of Jacksonian-Vicksburgian Boundary in East-Central Gulf Coast Using Evolutionary Series in Ostracods

A comparison of the Ostracoda from the Shubuta clay (Jacksonian Stage) and the overlying Red Bluff Clay (Vicksburgian Stage) of the east-central Gulf Coast region reveals an easy and reliable method of delineating the Jacksonian-Vicksburgian boundary which separates these Cenozoic shelf deposits.

Ten or more Shubuta ostracod species continue into the overlying Red Bluff, but another six span the Jacksonian-Vicksburgian boundary as evolutionary descendants. *Argilloecia subovata* Huff, *Buntonia shubutaensis* Howe, *Eucythere shubutaensis* Howe & Howe, *Occultocythereis broussardi* (Howe & Chambers), *Trachyleberis? montgomeryensis* (Howe and Chambers), and *Trachyleberis? quadrata* Howe & Howe are Shubuta Clay species which evolved into direct evolutionary descendants in the Red Bluff Clay. The descendants were respectively: *Argilloecia* sp. aff. *A subovata* Huff, *Buntonia* n. sp., *Eucythere woodwardsensis* Howe, *Occultocythereis kempi* (Howe & Law), *Actinocythereis quadrataspinata* (Howe & Law), and *Actinocythereis thomsoni* (Howe & Law).

HOWER, JAMES C., and GARRY D. WILD, Univ. Kentucky, Lexington, KY

Petrographic Variation in Western Kentucky #11 Coal Seam

Vitrinite reflectance (rank) and maceral percentages were studied on 90 samples of the western Kentucky #11 coal (and the correlative Illinois #6 coal) from 14 mines (13 in Kentucky, 1 in Illinois). The coals were collected in 3 benches from 2 to 3 channels per mine. The petrographic data were subjected to analysis-of-variance tests of the rank and of the percentage of reactive macerals.

The rank varies from high volatile C to high volatile B, the highest occurring in Webster County, Kentucky, and Gallatin County, Illinois. The seam has a consistently low percentage of inert macerals (generally less than 10%) throughout the field. The percentage of total vitrinite is usually greater than 80% with a decrease in telocollinite accompanied by an increase in "pseudovitrinite" rather than by an increase in the exinite or inertinite macerals. The consistent petrography, along with the large quantity of the reserves (second largest reserve base in western Kentucky), should make the seam an important resource for the synthetic fuels industry.

HUBBARD, CLYDE, and BRIAN FINE, Seiscom Delta Inc., Houston, TX

High-Resolution Landsat for Geophysical Studies

Landsat provides a tool which can significantly aid geophysical exploration programs. It can be used for