clastics, and locally to shales and evaporites. The high-energy ooid sand belt changes sharply into dark, fine-grained limestones and shales in a seaward direction. Early salt movement, buried basement structures, and growth faulting locally affected sedimentation patterns within the upper Smackover. Salt anticlines active during Smackover deposition leading to localization of favorable facies are particularly important along the east Texas and south Arkansas parts of the trend. Buried basement structures as well as salt structures controlled detailed sedimentation patterns in the Alabama-Florida parts of the trend, while growth faults controlled sedimentation along a narrow belt straddling the Arkansas-Louisiana border. Initial porosities and permeabilities were, however, generally high across the entire Smackover fairway prior to burial. Presently observed porosity-permeability trends are controlled generally by postdepositional processes including compaction, dissolution, cementation, and dolomitization. Regional differences in burial history along the Gulf rim, related in part to proximity to the isolated interior salt basins (Mississippi, north Louisiana, and east Texas salt basins), have resulted in striking differences in reservoir characteristics across the trend, reflecting significant regional differences in pathways of porosity evolution.

East Texas is a province dominated by dolomitized reservoirs, with production controlled by proximity to major fault trends, such as the Mexia-Talco, or to well-defined salt anticlines. Reservoir quality is tied inextricably to dolomitization. Dolomitization occurred early, associated with a regional fresh meteoric water system, hence reservoir characteristics were generally established prior to significant burial. Fracturing is a general feature of east Texas sequences, and there is evidence that fractures have acted as conduits for hydrocarbon migration. East Texas is generally a gas province, with oil migration occurring relatively early in the burial history of the sequence. Late burial diagenetic events in east Texas seem to have had little influence over ultimate porosity evolution.

Because of the depths involved, the south Texas Jurassic has been explored only superficially and no production has been established. Recent works by Loucks and Budd on the available material indicates strong similarity to east Texas relative to porosity evolution and general diagenetic framework. However, Loucks and Budd do note significant, late, subsurface, secondary porosity development.

South Arkansas, Louisiana, and Mississippi stand out in stark contrast to the Texas part of the trend. Reservoirs are generally limestones, with porosity either early fresh meteoric, secondary moldic, or preserved primary porosity. The early meteoric moldic porosity occurs in a predictable trend across the updip portion of the fairway. Reservoirs with preserved primary porosity occur in a band seaward of the secondary trend, and show no evidence of freshwater influence, or early diagenetic processes other than minor marine cements. Porosity preservation in this zone is a function of grain type (ooids versus pellets) and original sediment texture, and hence it is controlled ultimately by depositional processes. In the primary porosity zone, production is almost always associated with salt-related structures, while in the early secondary zone, updip permeability barriers (diagenetic and stratigraphic?) as well as salt-related structures are important. Late diagenetic events associated with migration of basinal derived fluids across the shelf during moderate burial include cementation dedolomitization, and calcite dissolution. All reservoirs in this part of the trend show ample evidence of significant porosity enhancement during this late solution phase. The limestone trend of Arkansas, Louisiana, and Mississippi is primarily an oil province with hydrocarbon migration taking place much later than to the west in Texas.

In Alabama and Florida, the trend is again toward dolomite reservoirs, with most dolomite and hence porosity permeability establishment early, and associated with meteoric water processes. Most large reservoirs such as Jay are associated with salt anticlines; minor production comes from updip basement structures. This part of the trend is mixed gas and oil. Hydrocarbon migration into reservoirs seems to have been a relatively late event.

The Jurassic upper Smackover of the Gulf rim is a simple sedimentologic system that has seen a complex and variable burial history along the trend which is distinctly reflected in major changes in diagenetic history, reservoir-porosity type, trap characteristics, and hydrocarbon migration timing.

MOORE, TIM, Placid Oil Co., Jackson, MS

Cotton Valley Depositional Systems of Mississippi

The Jurassic Cotton Valley Group in Mississippi is considered generally to be one formation, roughly equivalent to the Schuler Formation of Louisiana. Gross changes in lithology and electric log characteristics are observed across the state of Mississippi. These lateral variations are best discussed in terms of the depositional systems operant during Cotton Valley sedimentation. Through use of sand percentage and sand isolith maps, various depositional systems can be discerned.

Two delta systems existed in Mississippi: a constructive delta in the west-central part of the state, and a destructive delta in the east-central part. An interdeltaic system in central Mississippi, between the two delta systems, was bounded possibly on the south by a barrier-bar system. Elevation above wave base, caused by positive influence of the Wiggins arch and Hancock County high, resulted in development of a strand-plain system in southeast Mississippi. Lack of well control precludes a definitive statement about depositional environment in the southwest part of the state. By geographic relationship to the other depositional systems, a shelf system is inferred.

Recognition of the Cotton Valley depositional systems in Mississippi aids in identifying potentially productive trends which have yet to be adequately explored.

MUELLER, PAUL A., and JON W. PORCH, Univ. Florida, Gainesville, FL

Tectonic Implications of Paleozoic and Mesozoic Igneous Rocks in Subsurface of Peninsular Florida

The extensive Mesozoic and Cenozoic sedimentary sequences of peninsular Florida rest unconformably upon a basement of dominantly volcanic rocks. Major and trace element analyses of samples from six deep oil test wells in north-central and south-central peninsular Florida suggest the existence of two distinct volcanic provinces. The northern province contains calc-alkalic andesitic to rhyolitic rocks similar to those found along modern convergent (ocean-continent) plate boundaries. The southern province is apparently a bimodal suite of basaltic and rhyolitic rocks. These rocks exhibit certain geochemical features which suggest they were generated in a continental rifting environment associated with a mantle plume. Available age data indicate the northern volcanic province is at least early Paleozoic in age, whereas the volcanism in the south occurred during early Mesozoic.

NUMMEDAL, DAG, Louisiana State Univ., Baton Rouge, LA

Local Sea Level Change and Future of Louisiana Coast

The relative elevation of sea and land has been changing through time in response to two fundamentally different groups of factors. Global factors include changes in the volume of the ocean basins owing to tectonic processes and changes in the total amount of ocean water due to glaciation. Local factors include subsidence of continental margins and compaction of recent sediments. Over this century, global sea level (eustatic) appears to have been rising at a rate of 1.2 mm per year. Along the south-central Louisiana coast the land surface appears to be sinking at a rate of about 8 mm per year.

Recent global climatic modeling suggests strongly that we are about to enter a period of rapidly accelerating warming due to increased amounts of carbon dioxide in the atmosphere. As a consequence, eustatic sea level rise is predicted to accelerate because of both steric expansion of the ocean water and continued melting of polar ice caps. For the next 40 years the eustatic sea level rise may average 10 mm per year. The local relative sea level in coastal Louisiana would therefore rise at about twice its present rate over this time period. At this rate, local sea level will, in the year 2020, stand some 70 to 75 cm (2.3 to 2.5 ft) higher than at present.

The numbers presented above are average values for the Louisiana coastal plain. Local variability in subsidence rate appears to be related to the thickness of Holocene sediments. The highest rates of subsidence are found in the modern Mississippi (birdfoot) delta and in coastal Terrebonne Parish above the late Pleistocene Mississippi trench; in both areas the Holocene section is in excess of 200 m (650 ft) thick.

The high rate of local sea level rise along the Louisiana coast makes it imperative that plans for coastal development and protection consider the long-term consequences of sea level change.