



# FIELD TRIPS

## Important notes regarding field trips

- Field trip enrollment is limited and reserved on a first-come first-served basis.
  - Registration must be accompanied by full payment.
  - If you register only for a field trip, a \$30 non-registrant fee will be added to the field trip fee. This fee may be applied toward registration if you decide to attend the convention.
  - A wait list is automatically created if a field trip sells out. The AAPG Convention Department will notify you if space becomes available. Undersubscribed field trips will be cancelled.
  - Before purchasing non-refundable airline tickets, confirm with the AAPG Convention Department that the trip will take place.
  - It is important that you note your gender on your registration form for room assignments.
  - Several weeks prior to the trip, you will receive an itinerary with details of meeting points, transportation during the trip, phone and fax numbers and e-mail addresses of hotels and trip leaders, etc. Please indicate your fax and e-mail on your registration.
  - If any field trips meet your needs or the needs of your staff, you are encouraged to register early.
  - To help us better anticipate the number of attendees and avoid premature cancellation of field trips, please register well before 11 March 2010.
  - Neither AAPG nor trip leaders maintain insurance covering illness or injury for individuals.
- **Students – A limited number of student discount spots (approximately 50% of professional fee) are available in some short courses and field trips. Please register for the convention and then contact us at [convene@aapg.org](mailto:convene@aapg.org) or +1 918 560 2617 for availability in the course or trip you are interested in. If a discounted spot is available we will be happy to process your request at that time.**



1	The Wax Lake and Atchafalya Deltas: The New Regressive Phase of the Mississippi River Delta Complex (NOGS and SEPM)	Friday, 9 April	8:30 a.m. – 6:30 p.m. (departs from and returns to Ernest N. Morial Convention Center)	Professionals \$260 Students (limited) \$130
2	Hurricane Katrina — What Happened? The Geology of the Katrina Disaster in New Orleans (NOGS)	Saturday, 10 April	8:30 a.m. – 2:30 p.m. (departs from and returns to Ernest N. Morial Convention Center)	Professionals \$115 Students (limited) \$58
3	Evolution and Sedimentary Architecture of the Wax Lake Delta, LA, USA (AAPG-SC/SEPM)	Saturday, 10 April	8:00 a.m. – 7:00 p.m. (departs from and returns to Ernest N. Morial Convention Center)	\$25 (Students and Faculty Advisors only)
4	CO <sub>2</sub> EOR and Sequestration Project Near Natchez, Mississippi (DEG)	Friday, 9 April – Saturday, 10 April	7:00 a.m. – 5:00 p.m. (departs from and returns to Ernest N. Morial Convention Center)	Professionals \$385 Students (limited) \$193
5	Subsidence and Sea-Level Rise in Coastal Louisiana (SEPM)	Friday, 9 April – Saturday, 10 April	7:00 a.m. – 9:30 p.m. (departs from and returns to Ernest N. Morial Convention Center)	Professionals \$425 Students (limited) \$212
6	Geology of the Louisiana Coastal Zone: Implications for Coastal Management and Restoration (SEPM)	Saturday, 10 April	6:00 a.m. – 9:00 p.m. (departs from and returns to Ernest N. Morial Convention Center)	Professionals \$450 Students (limited) \$225
7	Geology of Unconventional Gas Plays in the Southern Appalachians (SEPM and EMD)	Wednesday, 14 April – Friday, 16 April	Trip departs 4:00 p.m. Wednesday, 14 April from Louis Armstrong New Orleans International Airport and ends at the Birmingham International Airport at 4:00 p.m. Friday, 16 April. Registrants must book their own transportation from Birmingham.	Professionals \$650 Students (limited) \$325
8	Fluvial-Deltaic-Submarine Fan Systems: Architecture and Reservoir Characteristics in a Convergent Setting – Jackfork, Atoka and Hartshorne Formations, Arkansas (SEPM)	Wednesday, 14 April – Saturday, 17 April	9:00 p.m. – 4:00 p.m. Trip begins and ends at Little Rock National Airport with expected arrival on 14 April prior to 9:00 p.m. and departure on 17 April after 5:00 p.m. Registrants must book their own travel arrangements to and from Little Rock.	Professionals \$730 Students (limited) \$365
9	Heterogeneity in Oolitic, Skeletal and Reefal Systems: Insights from the Holocene of the Abacos, Bahamas (SEPM)	Thursday, 15 April – Monday, 19 April	Trip starts 6:00 p.m. 15 April at Royal Palms Hotel, Freeport, Bahamas, for dinner and ends in Freeport around 9:30 a.m. on 19 April. Registrants must book their own transportation to and from Freeport, Bahamas.	Professionals \$1,500
10	Sedimentology and Stratigraphy of Shales: Expression and Correlation of Depositional Sequences in the Devonian of Tennessee, Kentucky and Indiana (SEPM)	Thursday, 15 April – Sunday, 18 April	Trip starts 1:00 p.m. 15 April at Nashville International Airport, Nashville, TN, and ends at the Indianapolis International Airport, Indianapolis, IN, at 12:00 p.m., Sunday, 18 April. Registrants must book their own transportation to Nashville and from Indianapolis.	Professionals \$625 Students (limited) \$313



## FIELD TRIPS

### Pre-Convention Field Trip 1

New Orleans Geological Society (NOGS) and Society for Sedimentary Geology (SEPM)

#### The Wax Lake and Atchafalaya Deltas: The New Regressive Phase of the Mississippi River Delta Complex

**Leader:** Dr. Harry Roberts (LSU School of the Coast and Environment-Coastal Studies Institute, Baton Rouge, LA)

**Date:** Friday, 9 April, 8:30 a.m. - 6:30 p.m. (departs from and returns to Ernest N. Morial Convention Center)

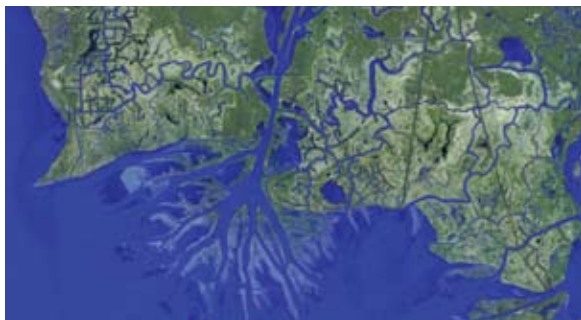
**Includes:** Transportation, guidebook and refreshments

**Fee:** Professionals \$260  
Students (limited) \$130

**Includes:** Transportation, guidebook, refreshments

**Limit:** 27 people

**Content:** 9 PDH; 0.9 CEU



This 2009 LANDSAT image of the Wax Lake Delta shows a pattern of distributaries and exposed delta lobes that are basically unaltered by human activity. Delta growth patterns, depositional processes, and the fundamental sedimentary architecture of the system will be focal points of discussions in the field using vibracores and other datasets.

The Wax Lake and Atchafalaya deltas represent the embryonic stage of a new Mississippi River Delta Complex which is being added to the previous five delta complexes that have formed Louisiana's coastal plain. Historical accounts document that the Atchafalaya River has been a distributary of the Mississippi since the 1500s. Since the mid-1900s it has been evident that the Atchafalaya River was steadily capturing more and more discharge from the Mississippi. In 1963 a control structure was built by the U.S. Army Corps of Engineers at Old River, the confluence of the two rivers. This structure limits flow down the Atchafalaya River to about 30% of the Mississippi discharge. Following the enormous flood of 1973 the Old River Control Structure was almost lost. Now there are two control structures at Old River. This same flood caused both the Atchafalaya and Wax Lake deltas to evolve from being subaqueous features to exposed deltas.

This field trip will offer the opportunity to learn about the Wax Lake Delta, its general evolution, sedimentary architecture and how it fits into the framework of the larger Mississippi River Delta depositional system. An orientation lecture at the Wax Lake boat launch will discuss the overall setting for Atchafalaya-Wax Lake delta

development, including the precursor filling of Atchafalaya Basin. We will then travel by boat to different deltaic environments, and concentrate on the processes of formation and sedimentary architecture of the Wax Lake bayhead delta. We will collect vibracores from a representative lobe of the delta to serve as focal points for discussing sedimentary facies and facies successions, as well as porosity and permeability trends and other reservoir characteristics. The trip will be valuable for sedimentary geologists, stratigraphers, other geoscientists and students.

### Pre-Convention Field Trip 2

New Orleans Geological Society (NOGS)

#### Hurricane Katrina — What Happened? The Geology of the Katrina Disaster in New Orleans

**Leader:** Dr. Stephen Nelson (Tulane University, New Orleans, LA)

**Date:** Saturday, 10 April, 8:30 a.m. - 2:30 p.m. (departs from and returns to Ernest N. Morial Convention Center)

**Fee:** Professionals \$115  
Students (limited) \$58

**Includes:** Transportation, guidebook, refreshments and lunch

**Limit:** 45 people



Depositional Environments of Lower Mississippi River Deltaic Plain - New Orleans Metro Area.

A combination of historical and geological factors in combination with inadequate design of levees and floodwalls resulted in a series of levee overtoppings and levee breaches in the New Orleans area during the passage of Hurricane Katrina on 29 August 2005. This field trip will travel to the sites of the major levee breaches where we will explore the geological, historical, and engineering factors responsible for the breaches and resulting flooding. During the trip, we will also get a better feel for the scale of the destruction caused by the levee breaches and discuss some of the issues involved in the rebuilding of New Orleans and protecting the city from future storms. A preliminary field trip guide and other material can be found at <http://www.tulane.edu/~sanelson/Katrina>.

### Pre-Convention Field Trip 3

AAPG Student Chapter (AAPG-SC/SEPM)

#### Evolution and Sedimentary Architecture of the Wax Lake Delta, LA, USA

**Leaders:** Harry H. Roberts (Louisiana State University Coastal Studies

Institute, Baton Rouge, LA, John

B. Wagner (Nexen Petroleum

USA, Plano, TX) and Robert T.

Clarke (Consultant, Irving, TX)

**Date:** Saturday, 10 April, 8:00 a.m. - 7:00 p.m. (departs from and returns to Ernest N. Morial Convention Center)

**Fee:** \$25 (Students and Faculty Advisors only)

**Includes:** Transportation, lunch, refreshments and guidebook

**Limit:** 27 people



This 2009 LANDSAT image of the Wax Lake Delta shows a pattern of distributaries and exposed delta lobes that are basically unaltered by human activity. Delta growth patterns, depositional processes, and the fundamental sedimentary architecture of the system will be focal points of discussions in the field using vibracores and other datasets.

This trip is oriented to all geoscience students and faculty advisors as an opportunity to study some of the dynamic modern environments associated with the classic Mississippi River delta system.

The Wax Lake and Atchafalaya deltas represent the embryonic stage of a new Mississippi River delta complex which is being added to the previous five delta complexes that have formed Louisiana's coastal plain. Historical accounts document that the Atchafalaya River has been a distributary of the Mississippi since the 1500s. Since the mid-1900s it has been evident that the Atchafalaya River was steadily capturing more and more discharge from the Mississippi. In 1963 a control structure was built by the U.S. Army Corps of Engineers at Old River, the confluence of the two rivers. This structure limits flow down the Atchafalaya River to about 30% of the Mississippi discharge. Following the enormous flood of 1973 the Old River Control Structure was almost lost. Now there are two control structures at Old River. This same flood caused both the Atchafalaya and Wax Lake deltas to evolve from being subaqueous features to exposed deltas.

This field trip will offer the opportunity to learn about the Wax Lake delta, its general evolution, sedimentary architecture and how it fits into the framework of the larger Mississippi River delta depositional system. An orientation lecture



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at the Wax Lake boat launch will discuss the overall setting for Atchafalaya-Wax Lake delta development, including the precursor filling of Atchafalaya Basin. We will then travel by boat to different deltaic environments, and concentrate on the processes of formation and sedimentary architecture of the Wax Lake bayhead delta. We will collect vibracores from a representative lobe of the delta to serve as focal points for discussing sedimentary facies and facies successions, as well as porosity and permeability trends and other reservoir characteristics. Arrival back in New Orleans is scheduled for the early evening.

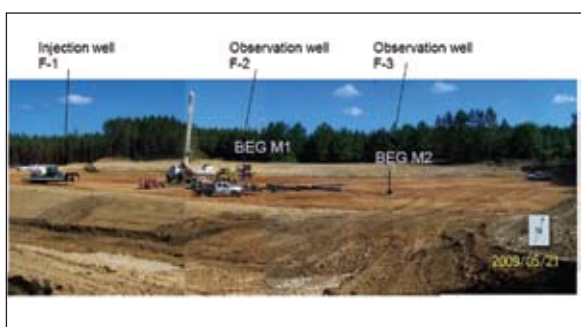
*Note: This field trip can be bought as a package with the AAPG/SEPM Student Short Course for only \$35.*

## Post-Convention Field Trip 4

Division of Environmental Geosciences (DEG)

### CO<sub>2</sub> EOR and Sequestration Project Near Natchez, Mississippi

- Leaders:** Dr. Tip Meckel and Dr. Susan Hovorka (Bureau of Economic Geology, The University of Texas at Austin, Austin, Texas)
- Dates:** Friday, 9 April, 7:00 a.m. – Saturday, 10 April, 5:00 p.m. (departs from and returns to Ernest N. Morial Convention Center)
- Fee:** Professionals \$385; Students (limited) \$193
- Includes:** Transportation, one night lodging, lunch, refreshments, guidebook, and evening reception at local historic plantation mansion
- Limit:** 40 people



The Cranfield test site, including a CO<sub>2</sub> injection well completed in the Lower Tuscaloosa Formation at 10,500 feet, and two nearby monitoring wells in the same interval. Monitoring techniques attempted include: In-zone and above-zone pressure monitoring, DTS, ERT, VSP, continuous active cross-well seismic, Saturation logging, and in-situ fluid sampling. Novel completion techniques were employed to accommodate this diverse monitoring strategy.

Educate yourself about the rapidly evolving carbon economy. This two-day field trip will focus on the carbon dioxide enhanced oil recovery (CO<sub>2</sub>-EOR) and carbon sequestration demonstration activities and monitoring under way at the Cranfield Field operated by Denbury Resources in southwest Mississippi. The trip is recommended for those involved in CO<sub>2</sub>-EOR and/or carbon sequestration activities. We will spend an afternoon and following morning on location at Cranfield to observe and

discuss ongoing injection, hydrocarbon recovery and monitoring of injected CO<sub>2</sub> for sequestration assurance.

## Pre-Convention Field Trip 5

Society for Sedimentary Geology (SEPM)

### Subsidence and Sea-Level Rise in Coastal Louisiana

- Leader:** Dr. Torbjörn E. Törnqvist (Tulane University, New Orleans, LA)
- Dates:** Friday, 9 April, 7:00 a.m. – Saturday, 10 April, 9:30 p.m. (departs from and returns to Ernest N. Morial Convention Center)
- Fee:** Professionals \$425; Students (limited) \$212
- Includes:** Transportation, one nights lodging (double occupancy), light morning snacks, lunch, dinner and refreshments
- Limit:** 20 persons
- Content:** 8 PDH; 0.8 CEU



Louisiana Marshland.

The Louisiana coastal plain, including the Mississippi Delta in the southeast and the Chenier Plain in the southwest, can be considered one of the classic modern analogs for hydrocarbon reservoirs around the globe. In addition to sediment supply, the accumulation of strata in this area is strongly controlled by the interplay of subsidence and sea-level change, and the Holocene record presents an outstanding opportunity to study these processes at a very high level of detail. The main objective of this field trip is to highlight a number of investigations carried out over the past decade that have led to new insights about rates and causes of relative sea-level rise in this area, including the role of subsidence and its spatial variability. Stops along the way will focus both on the methodology (coring and sampling techniques) of this work, as well as a discussion of key processes (e.g., glacio-isostatic adjustments, subsidence due to deltaic sediment loading, compaction) that control relative sea-level rise and coastal evolution in this region.

*Note: The temperature during this time of year can reach up to 90 degrees Fahrenheit (32 degrees Celsius). Participants should wear hats, sunglasses, light-weight clothing and closed-toe, rubber sole shoes. Plenty of drinks (water, Gatorade, and soda) will be available.*

## Pre-Convention Field Trip 6

Society for Sedimentary Geology (SEPM)

### Geology of the Louisiana Coastal Zone: Implications for Coastal Management and Restoration

- Leaders:** Dr. Mark Kulp, Dr. Mike Miner, Dr. Ioannis Georgiou (University of New Orleans, New Orleans, LA) and Dr. Duncan FitzGerald (Boston University, Boston, MA)
- Date:** Saturday, 10 April, 6:00 a.m. – 9:00 p.m. (departs from and returns to Ernest N. Morial Convention Center)
- Fee:** Professionals \$450; Students (limited) \$225
- Includes:** Transportation, light morning snacks, lunch, dinner and refreshments
- Limit:** 25 people
- Content:** 8 PDH; 0.8 CEU



Louisiana Beach Coastline.

The Louisiana Coastal Zone is one of America's most extensively studied and important coastal ecosystems in terms of natural resources, human infrastructure and cultural heritage. It also has the highest rates of coastal erosion and wetland loss in the nation due to a complex combination of natural land loss processes as well as alteration to the coastal zone by human activities. This land loss has prompted the development of regional coastal ecosystem restoration plans that are funded and guided by federal and state agencies with input from local stakeholders. A fundamental requirement for the most cost-effective design and completion of restoration projects is a solid understanding of the regional geologic framework and the processes operating along the barrier shorelines and within the interior wetlands.

Participants of the this field trip will gain first-hand experience of the Louisiana coastal zone by traveling from New Orleans to Fourchon, LA, by vans, then by boats to Timbalier Island. Stops along the way will focus on the modern coastal zone geomorphology, shallow and deep stratigraphy, and shallow and deep processes of the coastal zone with regard to Louisiana coastal zone restoration plans. Proposed restoration plans, socio-economic importance of coastal restoration and the politics of coastal restoration will also be discussed.

*Note: The temperature during this time of year is very unpredictable. The possibility for sun and 85*



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degrees Fahrenheit is as equally likely as windy, wet and 60 degrees Fahrenheit. Participants should be prepared for a range of weather conditions (e.g. be prepared to wear shorts or long pants the day of departure). Regardless of predicted weather conditions, participants should bring a hat/sun visor, sunglasses, rain gear, and closed-toe, rubber-sole shoes that can get wet. Plenty of drinks (water, Gatorade, and soda) will be available. Any participants with seafood allergies should notify the field trip leaders beforehand.

### Post-Convention Field Trip 7

Society for Sedimentary Geology (SEPM) and Energy Minerals Division (EMD)

#### Geology of Unconventional Gas Plays in the Southern Appalachians

**Leaders:** Jack C. Pashin, Richard E. Carroll, Marcella R. McIntyre and Rashmi L. B. Grace (Geological Survey of Alabama, Tuscaloosa, AL)

**Dates:** Wednesday, 14 April, 4:00 p.m. – Friday, 16 April, 4:00 p.m. (departs from Louis Armstrong New Orleans International Airport and ends at Birmingham International Airport). Registrants must book their own transportation from Birmingham.

**Fee:** Professionals \$650  
Students (limited) \$325

**Includes:** Airfare from New Orleans to Birmingham, AL, field transportation, two nights lodging based on double occupancy, breakfasts, lunches, refreshments in the field and guidebook

**Limit:** 25 people

**Content:** 17 PDH; 1.7 CEU



Helena Coal Outcrop.

The southern Appalachian thrust belt of Alabama hosts diverse unconventional gas plays in Paleozoic strata. Pennsylvanian-age coal-bearing strata in this region form the cradle of the modern coalbed methane industry and new natural gas plays are active in Cambrian and Devonian shale. This field trip will feature many of the best exposures of unconventional reservoir strata

in the southern Appalachians. Discussions will emphasize the numerous depositional, tectonic and hydrogeologic factors that affect resource distribution and production performance in structurally complex sedimentary basins.

*Note: Most outcrops will be along major roadways. However, one outcrop will require participants to hike and climb along a significant bluff and waterfall. To ensure a safe and productive field trip, participants are encouraged to bring steel-toed hiking boots or work boots, safety glasses and hard hats.*

### Post-Convention Field Trip 8

Society for Sedimentary Geology (SEPM)

#### Fluvial-Deltaic-Submarine Fan Systems: Architecture and Reservoir Characteristics in a Convergent Setting – Jackfork, Atoka and Hartshorne Formations, Arkansas

**Leaders:** Charles (Chuck) E. Stelting, (TierraStrat GeoConsulting, Rio Rancho, NM), G. Rick Kear (Schlumberger, New Orleans, LA), Arnold H. Bouma, (Texas A&M University, College Station, TX), Will Schweller (Walnut Creek, CA) and Charles (Charlie) G. Stone (Little Rock, AR)

**Dates:** Wednesday, 14 April, 9:00 p.m. – Saturday, 17 April, 4:00 p.m. (departs from and returns to Little Rock National Airport). Registrants must book their own travel arrangements to and from Little Rock to arrive prior to 9:00 p.m. Wednesday, 14 April, and depart after 5:00 p.m. Saturday, 17 April.

**Fee:** Professionals \$730  
Students (limited) \$365

**Includes:** Bus transportation in Arkansas, three nights lodging based on double occupancy, three breakfasts, three lunches and guidebook materials

**Limit:** 40 people

**Content:** 24 PDH; 2.4 CEU



Cyclic sedimentation style of deep-water Jackfork Group deposits at the DeGray Lake Spillway in central Arkansas, U.S.A.

The fluvial, deltaic, shelf and submarine fan depositional environments are all part of one large depositional system. It starts at the base of the mountains where grains of many sizes are generated, and terminates at the distal end of the turbidite system. Tectonics, climate, sediment characteristics, and sea-level fluctuations work interactively on the transport of sedimentary material. All these depositional systems contain sandstones and shales, channels and levee-overbank deposits, and they have a tendency to look alike on 2-D and 3-D seismic records.

Close-up studies reveal differences in architecture and reservoir characteristics. It is the purpose of the field trip to visit outcrops that contain these different types of depositional environments and to make the participants better aware of the criteria that reveal small and large-scale differences. All the outcrops that we will visit are in Arkansas and belong to the Mississippian Hartshorne, Atoka and Jackfork Formations. The sediments consist of fine-grained sands and shales and their equivalents are found in offshore siliciclastic basins worldwide (e.g., Gulf of Mexico, Brazil, Indonesia, North Sea and West Africa).

The field theme on Thursday will be continental depositional systems. On the second day, channel deposits of continental slope systems will be the field theme. The more distal deposits of the Ouachita Trough depositional system (basin-floor systems) provide the theme for the last day of the field trip.

*Note: Most of the site visits will be in active or abandoned quarries. Only moderate hiking will be required but extra footwear (rubber boots and field boots) and socks are a must, as well as head protection, sunglasses, insect spray, day pack and a lot of curiosity and questions. Standing water can be a problem, especially in the DeGray Spillway. Signed releases will be required as well as hard hats at the quarry site.*

### Post-Convention Field Trip 9

Society for Sedimentary Geology (SEPM)

#### Heterogeneity in Oolitic, Skeletal and Reefal Systems: Insights from the Holocene of the Abacos, Bahamas

**Leaders:** Gene Rankey (University of Kansas, Lawrence, KS) and Stacy Reeder (Schlumberger-Doll Research, Cambridge, MA)

**Dates:** Thursday, 15 April, 6:00 p.m. – Monday, 19 April, 9:30 a.m. (departs from and returns to Freeport, Bahamas). Registrants must book their own travel arrangements to and from Freeport to arrive prior to 6:00 p.m. Thursday, 15 April, at the Royal Palms Hotel for dinner and depart after 9:30 a.m.



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**Monday, 19 April**  
**Fee: Professionals \$1,500**  
**Includes: Field transportation, four nights lodging based on double occupancy, boat fees, breakfasts, lunches, dinners, refreshments in the field and guidebook**  
**Limit: 13 people**  
**Content: 20 PDH; 2.0 CEU**



Walkers Reef.

Ancient carbonate successions include rich hydrocarbon reserves hosted in shelf margin reef and sand shoal strata. To develop a better understanding of the nature and controls on possible depositional heterogeneity in subsurface systems, Holocene analogs provide the unique opportunity to observe both patterns and processes. This trip will focus on observing the nature and dynamics of shelf margin reef, reef apron, backreef shelf, and ooid shoal systems in the western Abacos, Bahamas.

The goals of the trip are to illustrate the range of variability in depositional facies and geomorphic patterns that can develop at or near carbonate shelf margins. We will place particular emphasis on biologic, geologic and oceanographic processes and how they impact vertical and lateral heterogeneity on this shelf margin. To do so, participants will examine surficial sediments, shallow cores and shallow seismic data, integrated within a spatial framework and within the context of depositional processes. Collectively, these data allow assessment of 3-D variability that could be used as guides for developing conceptual reservoir models.

All of the field localities will be used to generate discussion of how the observations from the Holocene can be most appropriately used to better understand and predict reservoir distribution and architecture in ancient analogs, in both exploration and production settings.

*Note: We will spend much of our time in waters from less than a meter to more than 15 meters deep. If you are not comfortable in or on the water, you should not come on the trip. We will make several traverses in the water. These are generally less than a few 100 meters long and at a leisurely pace. Your learning capacity will be greatly enhanced if you are in good physical condition so that you can observe without being*

*concerned about the water. If you do not swim regularly, you should practice until you can swim comfortably 100 meters non-stop. Similarly, we will be in the subtropics and you should expect that the sun and heat are greater than many expect. Daytime temperatures may exceed 90 degrees Fahrenheit. Sunburns are likely.*

**Post-Convention Field Trip 10**  
 Society for Sedimentary Geology (SEPM)  
**Sedimentology and Stratigraphy of Shales: Expression and Correlation of Depositional Sequences in the Devonian of Tennessee, Kentucky and Indiana**

**Leaders:** Juergen Schieber (Indiana University, Bloomington, IN); Kevin M. Bohacs and Ovidiu Remus Lazar (ExxonMobil Upstream Research Co., Houston, TX)  
**Dates:** Thursday, 15 April, 1:00 p.m. – Sunday, 18 April, 12:00 p.m. (departs from Nashville International Airport, and returns to Indianapolis International Airport). **Registrants must book their own travel arrangements to Nashville, TN, and from Indianapolis, IN.**  
**Fee: Professionals \$625 Students (limited) \$313**  
**Includes: Field transportation, three nights lodging based on double occupancy, breakfasts, lunches, refreshments in the field and guidebook**  
**Limit: 35 people**  
**Content: 24 PDH; 2.4 CEU**



Exposure of Middle to Upper Devonian black shales along Kentucky Route 52, Estill County, Kentucky.

Late Devonian black shales of the eastern U.S. are a key analog for hydrocarbon sources and shale gas reservoirs—they have long been studied for clues to ancient climates, past ocean conditions, and mass extinctions. Black shales were commonly thought to represent distal deposits that accumulated more or less continuously in deep waters of stratified anoxic basins. Recent research, however, has shown that these mudstones contain numerous stratal surfaces, primary sedimentary structures, and diverse burrows indicating discontinuous sediment accumulation under relatively energetic and benign conditions. In depth, petrographic and geochemical studies have also revealed that although bottom water conditions were often

oxygen restricted, truly anoxic conditions were probably exceedingly rare.

Experimental work on mud deposition at the Indiana University flume lab has demonstrated that laminated shales most likely record deposition from persistent bottom currents (capable of transporting coarse sand) rather than quiet water accumulation. Similar sedimentary structures are quite common in Devonian black shales, indicating an energetic depositional history.

Within these rocks, large-scale erosion surfaces can be traced for more than 600 km and commonly represent more time than the preserved shale strata. These erosion surfaces record intermittent decreases in accommodation and more energetic bottom conditions. Overlying mudstone strata show distinct stacking patterns bounded by laterally extensive surfaces that can be recognized in systematic changes in physical, biological, and chemical attributes. Participants will tie mudstone properties from outcrop to well-log cross sections and construct an integrated sequence-stratigraphic framework that highlights the distribution of hydrocarbon source, reservoir, and seal potential.

*Note: There will be only moderate hiking. Spring temperatures can be highly variable and rain is possible.*