December 11, 2015

Timing of Greenhouse to Icehouse Climate Change at the End of the Eocene; High-Resolution Results from Core and Outcrop Extending from Eastern Mississippi, Through Alabama and into the Florida Panhandle

Brooks B. Ellwood (LSU), Lawrence Febo (Chevron), & GEOL 4045 Stratigraphy Classes LSU Department of Geology and Geophysics

Abstract:
Redefining the Geologic Time Scale using the Global boundary Stratotype Section and Point (GSSP) concept began in 1972, changing how geologic time is defined. The reason for GSSPs is that a single global stratotype section can potentially provide the standard to which all other 'time-equivalent' successions can be compared. By making this comparison, it is possible to test if any geological event is actually synchronous. The most significant extinction in the Cenozoic is the Eocene-Oligocene (EOB) event. It is now well known that climate during most of the Eocene was quite warm (Greenhouse), but very early in the Oligocene, climate rapidly deteriorated, and the present relatively cold, Icehouse climate began. Was initiation of the change from Greenhouse to Icehouse abrupt, or gradual? How long did this take? Is the EOB, as now defined, everywhere time-synchronous? To help answer some of these questions, we have been looking at multiple localities in Mississippi, Alabama and Florida, where the EOB is exposed. This work includes collecting geochemical, geophysical and biostratigraphic data sets from these sites. In addition, this semester we contracted the Mississippi Survey to drill a well in eastern Mississippi, and the core collected appears to have captured the critical climate-change interval. One of the problems in understanding the global EOB is that timing (position) of the boundary has been redefined. The boundary is now based on the LOD (last occurrence datum - extinction) of the Hantkeninidae planktonic foraminifer family. Previous to the new definition, geologists in the SE USA argued that the classic Jackson-Vicksburg group boundary coincided with the EOB. Now that the boundary definition has changed, what is the effect on the EOB pick in the SE? Our current work, based on Hantkeninidae collections, shows that the redefined EOB still coincides with the Jackson-Vicksburg group boundary, because that is where Hantkeninidae goes to extinction in the SE. However, the current EOB also exhibits lithologic and isotopic excursions, ?18O and ?13C, that appear to represent the onset of significant glacial-interglacial cycles during E-O time. Thus Icehouse conditions occur at the EOB in the SE USA, and not later in the early Oligocene as has been argued. Our time-series analysis indicates that the Greenhouse to Icehouse shift appears to have developed gradually over a period of at least ~500,000 years, and was somewhat gradual until a tipping point was reached at the Shubuta-Red Bluff (Jackson-Vicksburg Group) lithologic boundary, when climate intensity abruptly increased. We interpret these results to indicate that the Shubuta-Red Bluff boundary level in the SE USA is coincident with onset of the current Icehouse glacial climate. The LOD of Hantkeninidae in Italy, where the EOB is defined, occurs before onset of glaciation that occurs AFTER the boundary in the early Oligocene (Oi-1). Therefore, if onset of glaciation and the extinction of Hantkeninidae are coeval in the SE USA, extinction of Hantkeninidae could not have been a globally time-synchronous event, but occurred later than in Italy. This hypothesis diminishes the utility of Hantkeninidae as an EOB indicator and questions the validity of the EOB extinction event. Our data and interpretations will be discussed.

Biography:
Dr. Brooks Ellwood is the Robey Clark Distinguished Professor in Geology at the LSU Department of Geology & Geophysics. He has been at LSU since 1999, serving as the Chair of the Department until 2003. Dr. Ellwood has also taught and held a variety of posts at the University of Texas at Arlington from 1983, where he is currently Professor Emeritus. In addition to LSU and UT - Arlington, he has taught at the University of Georgia. Over the years, he has taught numerous courses including Stratigraphy, Geoarchaeology, Geology of the National Parks, Solid Earth Geophysics, Exploration Geophysics, Paleoceanography, Paleomagnetism, Physical Geology, Historical Geology and others. He has over 150 refereed journal articles and book chapters, as well as many other works, including leading International field trips, Video Programs, teaching a National Parks distance education course, book and monograph chapters, published reports. Dr. Ellwood is a former Vice President, President, and Director of the Baton Rouge Geological Society. He has his PhD and MS from the University of Rhode Island, Graduate School of Oceanography and his BS from Florida State University, Department of Geology.

November 13, 2015

Using Fault Kinematics to Evaluate the Relationship Between Cenozoic Fault Activity, Sedimentation Rates and Salt Movement in the Gulf of Mexico- A Comparison Between Southwestern and Southeastern Louisiana
Abah Philip Omale of Louisiana State University

Abstract:

Fault initiation and reactivation across south Louisiana during the Cenozoic was driven by either clastic sediment progradation mobilizing underlying salt or by sediment progradation inducing tensional bending stresses during lithospheric flexure. Climate and tectonics within the North American continent during the Cenozoic created differences in the source location, amount of sediments transported, as well as the spatial and temporal distribution of sediments transported into the Gulf of Mexico. This study analyzes 140 fault intercepts along 11 regional cross sections containing well log data in south Louisiana. Cumulative throw, incremental throw, and fault slip rates indicate fault activity punctuated by periods of fault inactivity in southwest and southeast Louisiana. Results show a correlation between the timing of fault reactivation and the location of sediment depositional centers in the Cenozoic. In southwest Louisiana and southeast Louisiana faulting increases significantly in the Oligocene-Early Miocene and Early Miocene respectively during the emergence of new depositional centers in these areas. The pattern of fault activity correlates with the pattern of sediment deposition by showing a similar shift in major activity from southwest to southeast Louisiana through time. The Eocene period marks a time when most faults in southwest and southeast Louisiana were inactive, possibly because the sediment depositional center existed in central Louisiana. These data show that the timing of fault

activity correlates with the timing of sediment loading and salt movement as opposed to lithospheric flexure in the Cenozoic.

Biography:
Abah Philip Omale obtained a Bachelor's degree in Geology from the Federal University of Technology in Akure, Nigeria in 2009 where he worked on 'Predicting the Extinction of Lake Chad' for his senior thesis. In January 2013, he came to Louisiana State University for his Masters in Geology and graduated in August 2015. During his Master's program, he studied the interaction among fault activity, sediment deposition and salt movement in South Louisiana. He recently published his first paper in the GCAGS 2015 (Vol. 4) Journal.

October 9, 2015

Advances in Groundwater Plume Stability and Plume Diagnostic Evaluations
Mr. Joe A. Ricker, P.E of EarthCon Consultants, Inc.

Abstract:

Background/Objectives. Evaluation of the relative stability of a groundwater contaminant plume is generating increasing attention as many domestic and international stakeholders are realizing the applicability of plume stability as part of the environmental evaluation and/or remedial planning process of a site. This is especially important in the development of a long-term risk management strategy for a site. A plume stability evaluation allows the stakeholder to assess whether a contaminant plume is stable, decreasing, or increasing for a variety of metrics (i.e., area, concentration, mass, center of mass, and spread of mass). This allows better evaluation of whether additional remedial action is necessary, if risk-based closure of a site is applicable, or whether natural attenuation processes may be occurring at a site. The Ricker Method® for plume stability analysis1 is a unique method of evaluating plume stability that overcomes limitations posed by conventional well-by-well analysis techniques.

Approach/Activities. Outputs from the Ricker Method® can be used as a basis for primary analysis and other plume diagnostic tools that allow the user to further evaluate and communicate groundwater plume dynamics. This method has been used as a basis for the cessation of remediation systems, identification of commingled plumes, identification of potential unrealized source areas, and providing additional lines of evidence for natural attenuation; examples of which will be presented. This session will also present certain aspects of a proprietary analysis tool called Remediation System Benefit Analysis (RSBA®). RSBA® is an interpretation of the relative benefit of a remediation system based on graphical data outputs created from the Ricker Method® evaluation and additional data inputs. In effect, what RSBA® does is evaluate the efficiency of an active groundwater remediation system that removes contaminant mass from groundwater (e.g., pump and treat). The tool evaluates whether an active system may be considered efficient or inefficient based on an evaluation of contaminant mass removed via the system and the relative stability of a groundwater plume.

Results/Lessons Learned. The Ricker Method® has been successfully used as part of long-term risk management strategies to help stakeholders analyze unique groundwater plume characteristics including area, average concentration, and mass indicator, and describe the behavior of that plume as decreasing, increasing, or stable. Further, using the supporting plume diagnostic tools, we have been able to distinguish commingled plumes, demonstrate MNA progression, identify unknown source areas, define specific molar based signatures for chlorinated compounds, reduce monitoring requirements, and close sites.

Biography: Joe Ricker, P.E., located in EarthCon's Memphis, Tennessee, office has more than 21 years of environmental experience. Mr. Ricker has helped clients optimize a wide range of remediation solutions associated with past and present environmental liabilities under the CERCLA, RCRA, and State Superfund programs in more than 25 states including Louisiana. He brings a unique perspective to complex interdisciplinary projects and has managed remedial investigation and design projects involving a wide range of chemicals including pesticides, herbicides, wood-treating chemicals, solvents, metals, and PCBs in soils, sediment, groundwater and air. From a technology perspective, Mr. Ricker utilizes both standard and innovative options including a method he developed to evaluate groundwater contaminant plume stability - the Ricker Method® for Plume Stability Analysis. The Ricker Method® has been highlighted as an EPA Region 4 Showcase Pilot Project and has been accepted for use at several sites by multiple state regulatory agencies and USEPA regions. Mr. Ricker has conducted plume analytics training for EPA Region IV, EPA Region V, Missouri DNR, and Ohio EPA.

September 11, 2015

Drilling Horizontal Wells in the Bakken of North Dakota
Ms. Corey Shircliff, Louisiana Department of Natural Resources

Abstract: Drilling in the Williston Basin, which covers much of North Dakota and extends into Montana and Canada, has contributed significantly to the recent American oil and gas boom. The Bakken Formation, the most successfully drilled strata in the region, extends throughout the basin and is comprised of an upper shale unit, thin layers of sandstone and siltstone, and another lower shale layer. Both shales are organic-rich source rocks. To produce oil and gas from the Bakken, the well must be drilled horizontally between the two shale layers. After the well has been drilled, it must be hydraulically fractured in order to yield significant oil and gas. In June of 2014, the state hit a milestone of production: one million barrels of oil a day. This talk will review the regional geology, discuss drilling and completions styles, and briefly examine the land and economic repercussions of the success of the Bakken.

Biography: Corey began working for the Louisiana Department of Natural Resources in July of 2015. Previously, she worked for an independent oil and gas company in Houston, Texas as an operations geologist for the Bakken. Corey completed her Masters in Geology at Louisiana State University, and her

B.S. in Geology at Beloit College in Beloit, Wisconsin. Although a native of Louisville, Kentucky, Corey is a happy transplant to Baton Rouge due to its wonderful food, beautiful foliage, and cool dry weather.

August 14, 2015

Late Quaternary Paleovalleys and Archaeological Potential on the Outer Continental Shelf Offshore Louisiana

Mr. Richard P. McCulloh, Louisiana Geological Survey

Abstract: Pleistocene continental glaciation repeatedly lowered global sea levels by ~120 m below present. Alternating lowstands and highstands resulted in the deposition of shelf-phase deltas and valley incision on the exposed southwest Louisiana shelf. Stratigraphic units and their bounding surfaces associated with these deltas and within paleovalleys represent depositional environments and, potentially, preserved paleolandscapes that survived postglacial sea-level rise. Sediments filling paleovalleys are potential sand sources for coastal restoration. This project entailed review of 350 legacy paleovalley interpretations from cultural-resource and hazard-survey maps prepared since 1975, and digital synthesis of 122 of these. A Geographic Information System (GIS) was developed for data integration, analysis, and management. This required digitization of raster maps originally provided in Portable Document Format. Lack of consistency in classification schemes and nomenclature inhibited comparison between maps so a major component has involved reinterpreting and proposing a common standard. Preservation potential of landscapes favorable for hosting shelf archaeological sites is determined by incision of prospective-aged drainage courses sufficiently deep for terraces in paleovalleys to have escaped subsequent destruction during marine transgression and ravinement. Interpretation of geophysical records traversing the southwestern Louisiana OCS study area showed preserved channel and paleovalley fills beneath the uppermost transgressive unit. Interpretations of these and other potentially favorable configurations were based on seismic facies indicating (a) valley wall settings, (b) lenticular channeloid features, (c) mounds and adjacent sags, and (d) rollover structures adjacent to faults. The seismic-record intercepts of these configurations were plotted and then synthesized into polygons in a paleolandscapes map. Results show that favorable landscapes cluster densely in association with the paleovalleys of the Sabine and Calcasieu river systems.

Biography: Richard P. McCulloh holds a B.S. degree in geology from Oklahoma State University and an M.A. degree in geology from the University of Texas at Austin. He joined the Louisiana Geological Survey (LGS) in Baton Rouge after working for two years as a geologist for Conoco Minerals Inc. in the south Texas uranium district. At LGS, he has been involved in mapping and compilation of surface geology at scales ranging from 1:24,000 to 1:500,000, as well as other surface and subsurface investigations on topics relating to growth faults, shale-filled channels in the Wilcox Group, emergent salt domes in coastal Louisiana, and structural geomorphology as reflected in stream nets and alluvial courses.

July 10, 2015

Ethics for Geoscientists and Engineers
Mr. Bill Schramm, Louisiana Dept. of Environmental Quality

Abstract: Ethics has many definitions; it is a study of the rules of human behavior, the standards of right and wrong, that part of science and philosophy dealing with moral conduct, duty, and judgment, the voluntary actions specifically taken by an individual with sufficient knowledge of the options available. The development of these "rules" depends on the formative influences on the individual. They derive from the ethnic culture, predominant religion, educational philosophies and personal life experiences. Professional ethics incorporates and expands on these societal rules for a well-defined group of specialized, highly trained and educated persons in a specific career field. The ethics for professionals are particularly developed to address issues peculiar to that field. Examples are: medical, legal, police, military, science, and business.

Biography: Bill is a 25 year veteran of the Louisiana Department of Environmental Quality. As a Geologist he has worked closely with industry, consultants and private citizens to investigate and/or remediated over 3000 contaminated sites. He now supervises a staff of Geologists and Remediation Specialists in the Underground Storage Tank and Remediation Division. Since 2005 he has been an Adjunct Instructor on the staff of the Department of Geosciences at the University of Louisiana-Lafayette and serves on numerous Graduate Thesis Committees. Bill holds a BA and MS in Geology and a Teaching Certification for K-12 in Science and Earth Science. He is a member of the Baton Rouge Geological Society and has served for many years on the Board of Directors in many capacities. He also collects alphabets such as AAPG, GCAGS, LGS, NOGS, LEHA, NRA, USPA and EAA.

June 12, 2015

The Role of Horizontal Drilling in Industrial and Municipal Water Supply
Dr. George Losonsky, PhD, PG

Abstract: Horizontal drilling methods broaden the options for solving problems in both industrial and municipal water supply. Industries are under increasing pressure to shift their groundwater production from productive, high quality regional water supply aquifers to marginally productive, high TDS water bearing zones. Groundwater recovery systems employing the appropriate combination of vertical and horizontal wells can make this shift technically feasible. Attempts to control saltwater intrusion in thick, stratified aquifers are hydraulically challenging, as seen in the example of mitigation efforts under way in Baton Rouge municipal water supply aquifers. Horizontal wells may provide hydraulically effective saltwater mitigation alternatives. Horizontal drilling methods vary considerably based on geologic

setting and well applications, and selection of the appropriate drilling method can make or break a project.

Biography: George Losonsky has been president of Losonsky & Associates, Inc., of Baton Rouge, since 2005. He earned a BA in Geology from Oberlin College in Ohio in 1980 and is also a graduate of the University of Cincinnati where he earned both an MS in Physical & Chemical Processes in Geology in 1983, and a PhD in Geology/Hydrogeology at the H.N. Fisk Laboratory of Sedimentology. He has worked for the Center Hill Research Center/US EPA Risk Reduction Engineering Laboratory in Cincinnati; Midwest Water Resource, Inc., in Charlotte, Michigan; Baker Hughes in Houston; IT Group/Shaw Group in Lake Charles and other locations worldwide. Losonsky & Associates provides environmental consulting and horizontal well related services in Louisiana and throughout the USA, Asia, and Australia.

May 8, 2015

Current Efforts at Managing Salt Water Intrusion in the Baton Rouge Area
Mr. Anthony J. Duplechin, Director, Capital Area Groundwater Conservation District

Abstract: Due to heavy pumping of certain aquifers within the Capital area, saltwater from the south has moved across the Baton Rouge Fault into some of the fresh water aquifers in East Baton Rouge Parish. The Capital Area Groundwater Conservation District is empowered to take all necessary steps to prevent intrusion of salt water or any other form of pollutant into any aquifer or aquifers, including the powers to operate withdrawal wells for the extraction of salt water or water affected by any pollutant and to dispose of such water by injection or otherwise; to operate injection wells to create freshwater barriers against salt water intrusion or the intrusion of any other pollutant; and to control pumping rates by users in any area threatened by intrusion of salt water or other form of pollutant. The District is currently exploring its options to address saltwater intrusion in the “2,000-ft” sand.

Biography: Anthony Duplechin has been the Director of the Capital Area Groundwater Conservation District since March of 2011. He is a graduate of Louisiana State University where he earned a BS in Geology in 1974. Upon graduation he worked as a Hydrologist with the US Geological Survey. In 1981 he accepted a job with the Louisiana Department of Natural Resources, where he worked as a Geologist managing Louisiana’s surface coal mining regulatory program and later Louisiana’s groundwater resources program, until his retirement in 2011. He is certified as a Professional Geologist by the American Institute of Professional Geologists and is licensed by the States of Louisiana and Texas.

April 10, 2015

Gamma Ray Logging to Enhance the Understanding of Subsurface Contaminant Transport
Mr. Brent Lazenby, Geosyntec Consultants

Abstract: Downhole gamma ray logging tools measure the naturally occurring gamma radiation in materials surrounding a well or borehole and have been commonly used in in the oil and gas and mineral exploration industries for decades. The relative radioactive isotope content measured by the gamma ray tool is particularly useful in identifying relatively radioactive geologic materials, such as shale. Conversely, geologic materials exhibiting low radioactivity, such as limestone can also be identified. With the recent production of a 'slim fit' gamma ray logging instrument, the use of the technique may be applied more commonly in the environmental industry. Contaminant transport pathways from surface sources to groundwater are often dependent on the presence or absence of impermeable geologic layers. This presentation will explore the application of the slim gamma ray logging tool for improving a site geologic model that is crucial to understanding the transport of subsurface contaminants. The investigation yielded improved site geologic cross sections after less than a week of field work and utilized an existing recovery and monitoring network rather than performing costly deep (greater than 200 feet) borehole advancements.

Biography: Brent is a geochemist for Geosyntec Consultants in Baton Rouge and specializes in metals and nitrogen cycling in groundwater. Prior to living in Louisiana, Brent grew up in Ontario where he received his B.Sc. in Environmental Science from the University of Ottawa and M.Sc. in Hydrogeology at the University of Waterloo.

March 13, 2015

Coastal Protection and Restoration: Current Projects and Optimizing Resources
Mr. M. Jason Lanclos, P.E., Deputy Executive Director, Coastal Protection and Restoration Authority

Abstract: Mr. Lanclos will present an overview of the Coastal Protection and Restoration Authority (CPRA)'s mission, it's path forward and its plans for the new Center for River Studies in Baton Rouge. The CPRA Acts as the implementation and enforcement arm of the Board; Responsible for the implementation and enforcement of the master plan and annual plan; Implements the integration of hurricane protection, storm damage reduction, flood control, infrastructure, and coastal protection and restoration efforts in accordance with the master plan and annual plans; Administers the programs of the Board; Implements projects relative to the protection, conservation, enhancement and restoration of the coastal area of the state; Oversees the administration of all matters related to the study, planning, engineering, design, construction, extension, improvement, repair and regulation of integrated coastal protection; and Inspects hurricane protection and flood control levees and structures within the coastal area. Following Hurricanes Katrina and Rita in 2005, the Louisiana Legislature created the CPRA and tasked it with coordinating the local, state, and federal efforts to achieve comprehensive coastal protection and restoration. To accomplish these goals, the CPRA was charged with developing a Coastal

Master Plan to guide our work toward a sustainable coast. The Master Plan focuses its efforts and guides the actions needed to sustain our coastal ecosystem, safeguard coastal populations, and protect vital economic and cultural resources. Additionally, the Coastal Master Plan provides the context needed to evaluate other activities in the coastal zone, including: transportation, navigation, and port projects; oil and gas development; ground water management and land use planning.

Mr. Lanclos will also present relative projects on the restoration and protection side that the CPRA is currently working on. These projects help to shape the framework of restoration and protection projects working together and the critical role of optimizing resources and prioritization of projects.

Bio: M. Jason Lanclos, P.E. (Jason) is the Deputy Executive Director of the Coastal Protection and Restoration Authority (CPRA) in Baton Rouge and has served that organization since 2011. He was employed at URS as a Senior Engineer for 12 years prior to that and is an LSU graduate in Civil and Environmental Engineering.

February 13, 2015

Legal and Technical Aspects of Hydraulic Fracturing and Advances on Induced Seismicity
Professor Keith Hall, Director of Mineral Law Institute, LSU Law Center

Abstract:

Bio: Keith Hall is Director of the Mineral Law Institute and the Campanile Charities Professor of Energy Law at LSU Law School, where he teaches Mineral Rights, Advanced Mineral Law, International Petroleum Transactions, and a seminar that focuses on environmental issues associated with oil and gas activity. His academic research has focused on legal issues relating to hydraulic fracturing and, recently, legal issues relating to induced seismicity. Before joining LSU, he practiced law for sixteen years at a major firm in New Orleans, focusing on oil and gas law, environmental law, and toxic tort litigation. He earned a B.S. in Chemical Engineering and worked for eight years as an engineer before attending law school.

January 9, 2015

An Update on the Comite River Basin Project
Mr. Dietmar Rietschier, Executive Director for the Amite River Basin Drainage and Water Conservation District

Abstract: Mr. Rietshier will speak on the Amite River Basin Drainage and Water Conservation District's

(ARBC) efforts to mitigate flood damage in the Comite River Basin. The project consists of a 12 mile long diversion channel from the Comite River to the Mississippi River, a diversion structure at the Comite River, guide levees, Lilly Bayou control structure, four drop structures at the intersections of the diversion channel with McHugh Road, Bayou Baton Rouge, Cypress Bayou, and White Bayou, and Highway and Railroad Bridges. Low-flow augmentation pumps at the intercepted streams and an earthen closure at Brooks Lake, clearing and snagging of Bayou Baton Rouge, White Bayou and Cypress Bayou north of the diversion channel will reduce flooding in those areas.

Bio: Dietmar Rietschier (Deet-mar Reet-sheer) is the Executive Director for the Amite River Basin Drainage and Water Conservation District. He has been with ARBC since 1994. Mr. Rietschier is a strong proponent of a regional watershed approach that integrates all water related issues such as the amelioration of flooding problems, resolution of water quality issues under one planning-management process. Prior to his work with the Commission he worked in the private sector with various engineering consulting firms, the Capital Region Planning Commission on Transportation Planning of Federal highway projects for the Baton Rouge Urban Area, and the city of Denham Springs as Director of the Office of Planning and Public Works. Mr. Rietschier is a graduate of LSU with a Bachelor's Degree in Architecture and a Master's Degree in Civil Engineering.