Abstracts

Testing the Link Between Hydrocarbon Seepage, Sea Level Stands, and Salt Diapirism in Deepwater Gulf of Mexico

Paul Aharon,
Department of Geology and Geophysics, Louisiana State University, Baton Rouge, LA 70803

Hydrocarbon seepage in both liquid (crude oil) and gas (principally methane) forms has been amply documented over the past decade from submersible dives on the northern Gulf of Mexico seafloor overlying salt diapirs. These seepage sites are inhabited by a remarkably diverse chemosynthetic fauna and are associated with massive carbonate buildups formed through bacterially-mediated processes of hydrocarbon oxidation coupled with sulfate reduction. This study addresses questions concerning the timing and longevity of seepage from four representative sites in the Green Canyon area (27°50'N; 91°30'W) on the basis of radiometric dating assays of massive carbonates that act as time keepers of hydrocarbon seeps.

^{230}Th dates from GC-140 and GC-184 blocks place the initiation and termination of massive seepage there at 195 ±25 Ka and 13.3 ±2.7 Ka, respectively, and are in agreement with the chronology of the salt dome emplacement at shallow depth during mid to late Pleistocene low sea-level stands. The prolific seepage activity to the southeast in GC-185 (Bush Hill) and the ^{230}Th dates of 3.2 to 1.4 Ka are attributed to a recent episode of subsidence caused by salt withdrawal which created late normal faults. When multiple dates, subsurface imaging of the salt domes by 3-D seismics, and high resolution subsurface chronostratigraphy are available from the same site, a link is apparent between the incidence of low sea level stands, salt diapirism, and enhanced hydrocarbon seepage.

Environmental Reconstruction of a 19th-Century Red River Raft Lake: Caddo Lake, Louisiana and Texas

Mary L. Barrett
Department of Geology and Geography
Centenary College, Shreveport, LA 71134-1188

Reconstruction of modern fresh water sedimentary environments from both the sediment record and historical documents provides valuable insight into aquatic ecosystem change in time-frames of human occupation and water management. Lake deposits are particularly suited, as this environment intercepts and receives most sediment transported through a watershed. Such an approach is used in the historically well-documented Caddo Lake region of northwestern Louisiana and northeastern Texas to reconstruct its 200-year history and origin as a raft lake associated with the Great Raft of the Red River.

Sediment thickness measurement and description plus time-line establishment for 1800, 1873, and 1963 indicate the lake's 19th-century depositional history was strongly influenced by Red River backflow westward through the old flooded Cypress Bayou tributary, opposite of today's dominantly eastward flow from the Texas side. Sedimentation rates were at least 10 times greater in eastern Caddo Lake prior to the final 1873 log-jam removal on the nearby Red River. Higher sedimentation rates have always existed in the topographically-low flooded channel versus the shallower-water old floodplain. Pre-1873 sediment accumulation rates approached 2-3 cm/yr, falling to 0.3-0.4 cm/yr after log-jam breakup and return to pre-raft river and tributary flow. Extrapolation of average 20th-century sedimentation rates into the future suggest complete filling of the deeper Louisiana lake region would require around 1000 years.