Atchafalaya-Wax Lake Deltas: An Update on Geologic and Oceanographic Impacts of the Latest Mississippi River Delta-Switching Event

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This youngest episode of 'delta switching' started centuries ago but because of inland sedimentation it has resulted in delta-building at the coast only since the 1950s. Data from high altitude color-infrared photography acquired by NASA and USGS plus hydrographic data from Atchafalaya River and Wax Lake Outlets comprise 125.8 km^2 of new land above the -0.3 m (-1 ft) datum (~ mean low tide). Since 1981 growth of the Wax Lake delta has averaged -2.9 km^2/yr above this reference level. The lower Atchafalaya River delta, which was the first to appear (in 1973), has grown at a slower average of 1.9 km2/yr over this same period. The Wax Lake delta did not start rapid growth until about 1981 because of sedimentation in local inland basins (e.g., Wax Lake). Growth of the Atchafalaya delta has slowed because of the efficiency of sediment transport to the adjacent continental shelf via a dredged navigational channel coupled with siltation of secondary channels. Both deltas are comprised of sand-rich lobes (3-4 m thick) that systematically fuse to form rapidly expanding deltas that have nearly filled Atchafalaya Bay. Suspended sediments that by-pass the deltas form a distinct plume that extends far beyond Atchafalaya Bay. During medium-to-high discharge conditions (>4250 m3/s) the plume may extend up to 50 km and cover an area of over 7400 km^2. Plume area and location is highly variable and depends largely on wind direction, speed, and duration. Suspended sediment deposition is impacting the shelf and the downdrift Chenier Plain coast.

Accessing State Ground-Water Database and Displaying Geospatial Data Through Innovative GIS/Internet Technologies

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The main objective of this project was to utilize current GIS/Internet technology to efficiently disseminate hydrological data for the State of Texas to the public. The Texas Water Development Board maintains an INFORMIX relational database (RDB) that contains records for over 118,000 water wells of the estimated 1,000,000 wells statewide. The database also contains detailed information on well location, elevation, depth, well type, owner, aquifer, driller, construction, water-quality, and water-level data. The water quality information includes analyses of major cations and anions and other infrequent constituents. The database contains more than 82,000 total analyses from 47,000 ground-water sites, close to 190,000 infrequent constituents, and 513,000 water levels. In addition to the database, the TWDB maintains USGS 7.5 minute topographic maps with plotted well locations. The database and maps are primarily used by TWDB staff, water districts, and planners to project future water supplies and usage, and by environmental consultants in site assessment/feasibility studies.

A combination of GIS software, Internet software and Visual Basic programming was utilized in developing an application that would function within the agency to serve TWDB staff and outside the agency to distribute information via the World Wide Web (WWW). Visual Basic and ESRI's object-oriented programming language (AVENUE) were utilized to customize a Graphical User Interface that would allow users with little or no experience to easily access the TWDB ground-water database. Water well locations are displayed on detailed base maps. The application allows the query of geospatial and tabular data. Specific searches of the INFORMIX database can also be performed through SQL statements.

TWDB planners, geologists, and field staff currently respond to more than 300 inquiries a month and provide ground-water information in digital or hard-copy format. Given the recent explosion of WWW usage, sharing geospatial data via the an Internet/intranet application is a cost-effective solution to providing the public with access to large databases.

Deepwater Site Characterization: the Preliminary Results of the Deep-Tow Survey of Pigmy Basin and Alaminos Canyon, Gulf of Mexico

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The growth in exploration efforts targeting the continental slope of the Gulf of Mexico has fostered an awareness of the scarcity of information available on the geology and processes characteristic of the slope environment. The Offshore Technology Research Center's Deepwater Site Characterization project was conceived in response to this need. An integral part of the project is a series of

high-resolution geophysical surveys of the project's three theme sites: Pigmy Basin, Alaminos Canyon, and Vaca Basin using the TAMU Deep-Tow system. To date, the Pigmy Basin and Alaminos Canyon surveys have been completed, while the third survey (Vaca Basin) is scheduled for spring, 1997.

TAMU Deep Tow system, a refurbished version of the EDO Deep Tow donated to Texas A&M by Shell Offshore Inc., includes a DYNACON traction winch system, the topside electronics, and an ocean-depth instrument package (a 3.5 or 7 kHz subbottom profiler, a 100 kHz side-scan sonar, a depth sensor, and a direction-locating pinger) housed in a 5m, bottom-tracking tow vehicle. The high resolution records obtained in both surveys are outstanding in their clarity, resolution, and consistency. The records presented here are representative of the preliminary results of the surveys, and include examples of the seafloor and subbottom features characteristic of the two sites. In addition, the highly variable nature of the slope with respect to the types of processes and their degree of activity is clearly evident in a side-by-side comparison of the data from the two sites.

Integrated Use of Multiple Remedial Technologies to Address DNAPL Contaminated Aquifers at Paxon Polymer Company, Baton Rouge, La.

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Pre-RCRA disposal practices caused the release of chlorinated hydrocarbons (CHCs) into the shallow ground water at the Paxon facility. This impact was reported to the Louisiana Department of Environmental Quality after a due diligence survey discovered the contamination. A phased investigative approach determined that the upper three water bearing units are affected by multiple contaminants forming a DNAPL plume.

Remedial actions proposed to the Agency and implemented during 1994-95 includes soil vapor extraction and air sparging for uppermost zone and pump and treat for contaminated water removal in all three zones. During the past 2 1/2 years of operation, the system efficiency has been evaluated and continuous adjustments have been made to enhance contaminant recovery.

Of primary concern to the facility is the control of downward movement of contaminants. Efforts to optimize recovery included manipulation of recovery rates and installation of additional equipment. Data assimilated during system operation suggests the effective recovery of CHCs in the upper two zones, however, it is apparent that zone three contaminant migrations may have been exacerbated by pumping the second zone. Contaminant levels rose dramatically in zone three after the startup of recovery of zone two. Conversion of the observation well in zone three to a recovery well has shown effective removal of CHCs.

This paper will focus on system reaction to changing vadose zone conditions, efforts to improve contaminant recovery, and the problems of managing downward movement of DNAPLs.

Delta-Front Turbidites: A Poorly Understood but Productive Play Type in the Gulf Coast

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Although turbidites are typically associated with deep-water environments, they also can be preserved in shallow shelf settings. Sandy turbidites originating as density underflow currents or from sediment failure events are common in the delta-front region of most fluvial-deltaic systems. This is particularly true of shelf-edge deltas characterized by high sedimentation rates, a common condition in Gulf Coast reservoirs.

Like basinal turbidites, delta-front turbidites are deposited from suspension in a downslope-directed gravity flow. Internally, the sandy reservoir beds exhibit stratification typical of waning flow energy and are commonly normally graded. Core and outcrop examples tend to show a higher percentage of clasts and dispersed organic grains than most deep-water turbidites.

Unlike basinal turbidites, delta-front turbidites are typically nonchannelized. Although individual flows may be directed down gullies or other bathymetric depressions, the resulting deposits tend to be lobate and suggest that reservoir geometry and character is determined mainly be sheet-flow processes. Lateral continuity of delta-front turbidites probably is somewhere between deep-water sheet sands and deltaic channel mouth bar deposits.

Production histories from several Gulf Coast fields show prolific production from vertically stacked delta-front turbidite packages. Although intermixed mass movement deposits can complicate the reservoir succession, they can also improve vertical connectivity. An improved understanding of delta-front turbidites requires development of reservoir models that integrate geological, geophysical, engineering, and production data.