The lower Tuscaloosa occurs at depths between 9,010 and 9,650 ft in the du Pont de Nemours I Lester Earnest well, Sec. 4, TBS, R13W, Harrison County, Mississippi. The diagenetic history of the section has been determined by means of thin-section, SEM, and XRD studies. The diagenetic sequence can be resolved into the following stages: (1) mechanical compaction; (2) early pyrite and nodular siderite development; (3) relatively early dissolution of atollarps and lithic fragments; (4) authigenic chlorite formation; (5) "wheat seed" and rhombic siderite formation, probably early; (6) syntaxial quartz cementation; (7) formation of authigenic vermiform kaolinite, and precipitation of poikilitic ferroan calcite and ankerite cement; and (8) carbonate cement dissolution, possibly accompanied by further silicate dissolution and minor amounts of additional mechanical compaction.

The ferroan calcite and ankerite cements are both characterized by sweeping extinction, more pronounced in the ankerite. The semi-quantitatively analyzed calcites contain approximately 6% total iron plus manganese. "Minus cement porosity" values (sum of volume of open pore spaces plus volume of cement) suggest very early cementation at shallow burial depths. However, the cement composition indicates a much deeper site of origin, and close examination of cement-grain contacts suggests that much grain-surface etching and grain replacement have occurred. The general applicability of minus cement porosity curves for determining depth of cementation (as used by some authors) is therefore thrown into doubt, unless replacement carbonate can clearly be separated from true (pore-filling) cements.

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Submarine Fan Diversion by Tectonic Processes—Magdalena Fan and Slope, Southern Caribbean

The present site of deposition of deep-water sediments sourced by the Magdalena River is a series of slope valleys and the abyssal plain north and east of the present river mouth. While fine sediment and some sand are being transported downslope by leveed channels originating near the crest of the river mouth bar, slumpes of bed-load sediment are feeding the heads of submarine canyons northwest and west of the river mouth. Uplift of the Atlantic-Turbico hills across the river's course caused the depositional site to shift east and northeast. Since then, the river has partially filled its estuary and has prograded three small, submerged delta lobes across a narrow shelf and has begun developing a new fan surface with leveed channels north-northeast of the river mouth, extending to water depths of about 1,100 m. This appears to be the site of the newly prograding, predominantly muddy fan system.

While fine sediment and sand are being transported downslope by leveed channels originating near the crest of the river mouth bar, slumpes of bed-load sediment are feeding the heads of submarine canyons northwest and west of the river mouth. Detailed bathymetric mapping of the continental slope reveals an integrated canyon system transecting northeast-southwest-trending valleys and ridges. Most of the river bed load appears to be transported down the submarine canyons, either to be deposited in the valleys or to be transported to the abyssal plain after several episodes of entrainment. The present distribution of sediments in the canyons and valleys reflects an ephemeral suite of turbidite facies with widely varying rates of accumulation.

Four lithofacies were recognized in piston cores from the continental slope. Sand occurs as massive beds from 20 cm to more than 3 m thick in upper slope canyons and in small channels within synclinal valleys. Interbedded sand and silty clay comprise a second facies consisting of 0.2 to 65-cm sand beds separated by thin clay and silty clay interbeds. This facies occurs mostly on the upper slope near the river mouth where the site of the new submarine fan system is developing. The facies grades laterally and downslope into pelagic clay.