SUBMARINE FAN DIVERSION BY TECTONIC PROCESSES—MAGDALENA FAN AND SLOPE, SOUTHERN CARIBBEAN

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ABSTRACT

The present site of deposition of deepwater sediments sourced by the Magdalena River is a series of slope valleys and the abyssal plain north and east of the present river mouth. During the Pliocene and Early Pleistocene, sediments were actively fed to the Magdalena Fan southwest of the river mouth. Uplift of the Atlantico-Turbaco 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 down to water depth of about 1100 meters. This appears to be the site of the newly prograding, predominantly muddy fan system.

While fine sediment and some sand are being transported downslope by leveed channels originating near the crest of the river mouth bar, slumps 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 2 mm to 65 cm thick sand beds separated by thin clay and silty clay interbeds. This facies occurs mostly on the upper slope near the river mouth where the surface of the new submarine fan system is developing. The facies grades laterally and downslope into pelagic clay.

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