tional streamers.

To demonstrate data enhancement obtained by these techniques, a line was surveyed in the Gulf of Mexico, first with the 500-channel system and then with a conventional 48-channel streamer. When the 500-channel data were processed to duplicate the conventional streamer data, the larger system yielded better results for late as well as early times; this improvement may be attributed partly to reduced cable noise. Comparisons made with record sections and stacked sections show that: (1) long, beam-steered arrays can enhance deeper events while retaining the high-frequency content of shallow data, and (2) short arrays at small group intervals allow fine resolution of shallow events.

The ultimate approach to preserving broadband information is full 500-channel processing of individually recorded channels. With such processing, individual hydrophone groups can be considered essentially as points. When the Gulf of Mexico data are processed in this way, signal continuity persists to frequencies above 125 Hz, and lateral changes are observed to the limit of resolution provided by the 3-m spacing of the output stacked traces.

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Porosity Evolution in Upper Cretaceous Austin Chalk Formation, South-Central Texas

Austin Chalk in south-central Texas was deposited in an unique environment that consisted of a relatively shallow-water platform and adjacent deeper water. Shallow water promoted deposition of highly fossiliferous chalks that contained appreciable quantities of aragonitic constituents. These anomalous sediments periodically were transported into the adjacent basin, a site of more typical chalk deposition.

Porosity and geochemical trends support petrographic evidence that the Austin Chalk underwent a greater degree of diagenesis than did European and North Sea chalks of similar age. Porosity reduction occurred more quickly and earlier in the Austin Chalk's burial history, and at shallower burial depths than in these other chalk sequences.

Exposed, relatively shallow-water Austin Chalk sediments now average 20% porosity but were never deeply buried. Porosity reduction resulted from early physical compaction followed by freshwater dissolution of aragonitic grains and associated cementation by non-ferroan calcite. Relatively low bulk iron and strontium concentrations resulted from this diagenesis.

More basinal and oil-productive Austin Chalk averages 5% porosity. After early physical compaction, most porosity loss resulted from pervasive pressure solution and concomitant cementation. Some cementation occurred when aragonite (where present) was stabilized under higher burial temperatures prior to pressure solution. Cements are mostly ferroan calcite. Progressive burial diagenesis further obliterated primary matrix fabrics and gradually depleted bulk oxygen-18. Relatively higher bulk iron and strontium concentrations reflect this diagenetic history.

Austin Chalk is capable of producing solely from its preserved matrix porosities and permeabilities although late-stage fracturing does enhance production.

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Association of Stylolitic Carbonates and Organic Matter: Implications for Temperature Control on Stylolite Formation

Petrographic and geochemical examination of carbonate-rock samples collected from three cores penetrating the Slave Point Formation (Middle Devonian, northwestern Alberta, T96-R4W6) have demonstrated a local association between high concentrations of organic matter, the presence of ferroan calcite and ferroan dolomite, and significant stylolite development. The stratigraphic succession of stylolitic and nonstylolitic rocks indicates that overburden pressure alone was not the main control on stylolite formation. Light-colored, pelletal/skeletal grainstones contain fewest stylolites and lowest concentrations of organic content (TOC 0.2%). In contrast, dark-brown lime wackestones and mudstones contain abundant stylolites and contain organic carbon contents as high as 1.0% and extractable organic matter (EOM) contents as high as 1,600 ppm. Organic matter is concentrated as an insoluble residue along stylolites; concentration developed during diagenesis as a result of selective solution of soluble carbonate-rock matrix. However, the greater abundance of stylolites in mudstones relative to grainstones suggests that factors inherited from original depositional environments have affected the tendency for later stylolite formation.

We suggest that acidic species, principally CO_2, released by catagenetic alteration of autochthonous organic matter, can dissolve sufficient carbonate to initiate stylolite formation prior to significant pressure solution. Solution of carbonate in the reducing environment of organic diagenesis also had led to the precipitation of ferroan calcite and ferroan dolomite along stylolites. These minerals are notably absent from nonstylolitic intervals.

Stylolite formation in carbonate rocks may be related to type and distribution of autochthonous organic matter, which then is related to depositional environment. In addition, thermal history (rank level) of the section will also effect the depth at which stylolites form. Thus, in some carbonate rocks, subsurface temperature rather than pressure may be a more significant factor in determining the depth of stylolite formation. It is proposed that carbonate solution by organic-derived acidic species may act as an important mechanism by which carbonate rocks may locally concentrate organic matter, and produce conduits along which generated hydrocarbons may be expelled.

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Pennsylvanian Fan-Delta Deposition, Mobeetie Field, Texas Panhandle

A prism of Pennsylvanian and Lower Permian arkosic sandstone and conglomerate (granite wash) was deposited in alluvial fans and fan deltas north of the Amarillo uplift in the Anadarko basin. Deposits adjacent to the main bounding fault are as much as 1,500 m thick but thin to 30 m within approximately 60 km of the uplift. Mobeetie field, in northwest Wheeler County, is located 16 km north of the basement uplift, at the northern limit of upper Missourian granite-wash sedimentation. Oil and gas are produced from a sequence of Missourian granite wash and interbedded carbonate rocks.

The oldest Missourian carbonate unit and the overlying classic unit form a representative depositional cycle. In the carbonate unit, a series of elongate, phylloid-algal mounds composed of algae-foram wackestones and packstones developed along strike and separated the open shelf from a more restricted lagoonal environment. Progradation of coarse-grained clastics onto the carbonate shelf halted carbonate pro-