transition flow beds, and 2 kinds of dune beds. Bed material used in the study was a moderately well sorted sand (median = 0.286 mm) from the Rio Grande near Bernardo, New Mexico. Opaque heavy minerals consisting mainly of ilmenite and magnetite (median = 0.144 mm) made up 0.38% of the bed material by volume.

Concentrations of opaque heavy minerals were formed as 3 basic types: (1) small thin concentrations associated with dunes that lacked topset beds and on the stoss sides of large dunes with topset beds; (2) concentrations associated with the topset deposits of large dunes and with dunes formed in the transition flow; and (3) widespread concentrations associated with the flat-bed condition.

The most important factors influencing the type and degree of sorting of the opaque heavy minerals from light minerals were bed configuration and grain density. The thickest deposits of heavy minerals were associated with the topset deposits of large dunes, but the most widespread deposits were associated with the flat-bed type of bed form. Density is important to segregation because the differences in shear stress necessary to move the light minerals and to move opaque heavy minerals are large. Equivalent fall velocities of grains of two different densities were determined to have little importance in local segregating mechanisms.

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CAUSES OF TEMPORAL CHANGES IN CARBONATE COMPENSATION LEVEL

Numerous authors have treated the $CaCO_3$ compensation level in deep-sea sediments as an immutable boundary fixed by temperature and pressure. Some have gone so far as to use it as a paleodepth indicator. This concept is totally invalid. Actually the depth at which calcite solution becomes important is controlled by a delicate balance between carbon supply to the ocean and carbon removal by organisms. The fact that organisms precipitate $CaCO_8$ from seawater far faster than it is being supplied by rivers demands that solution take place. The proportion of the sea floor bathed in calcite undersaturated water is such that the precipitate in excess of supply is returned to solution. In such a system changes in supply rate of carbon, productivity of carbonate producing organisms, and mixing regime of the oceans will upset the delicate balance between supply and demand and lead to fluctuations in the level of compensation. That such changes can occur on a short time scale is demonstrated by the fact that the compensation level was lower during glacial than during interglacial times. It is not at all surprising that the JOIDES cores show evidence of large fluctuations in this level through Tertiary time.

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RECOGNITION OF FLUVIAL AND DELTAIC SANDSTONES OF PENNSYLVANIAN AND PERMIAN AGES IN NORTH-CENTRAL TEXAS

Sedimentary and stratigraphic evidence indicates that most Virgil and Wolfcamp elongate sandstones on the Eastern shelf of north-central Texas are segments of dip-fed fluvial and deltaic depositional systems. These sandstone bodies are composed of superposed delta front, channel-mouth bars, and distributary channels, on top of which are superimposed fluvial and peripheral sheet and small barlike bodies.

Fluvial facies consist of channel-fill sandstones and conglomerates, and overbank mudstones and siltstones; levee deposits are difficult to recognize. Elongate sandstones enclosed in overbank mudstone become finer upward, and characterize fine-grained meander-belt deposits; braided and coarse-grained meander-belt sandstones are extensive tabular to highly belted bodies with little mudstone.

Constructional deltaic sandstones become coarser upward. Delta-front facies display parallel and ripple bedforms, and commonly show distorted basal bedding resulting from subsidence into prodeltaic muds. Channel-mouth bars are normally distorted sandstones with trough crossbedding and small scour channels. Symmetrically filled distributary channels are shallow and up to 50 yd wide. Delta-front sandstones grade laterally into thin, destructive sheet sandstones and strandplain facies within adjacent interdeltaic areas.

Delta progradation, fluvial aggradation, compaction, avulsion, destruction, and marine transgression, followed by later reoccupation of deltaic and fluvial sites, result in distinctive lateral and vertical facies relations.

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ORIGIN AND CONTROLS ON DISTRIBUTION OF ARID SUPRATIDAL (SABKHA) DOLOMITE, ABU DHABI, TRUCIAL COAST

Holocene dolomites in supratidal carbonate beds south of Abu Dhabi are polygenetic. The overall distribution of most *authigenic* dolomite is controlled primarily by a pre-Holocene Pleistocene sand topography.

Two types of dolomites are present: (1) a series of disordered calcium-rich dolomites ($Ca^{52}Mg^{48}$–$Ca^{57}Mg^{43}$), and (2) a disordered stoichiometric dolomite ($Ca^{50}Mg^{50}$). Dolomitic carbonate muds contain various combinations of calcium-rich dolomite species and/or stoichiometric dolomite.

Calcium-rich dolomites have two origins. A major part is formed by reaction of aragonite and magnesium calcite with seawater-derived brines ("marine dolomite"), and a minor but locally significant part is formed by reaction of aragonite and calcite with continental groundwaters. The stoichiometric dolomite is detrital and of wind-blown origin. Authigenic dolomites form the major fraction, but locally 25% is detrital dolomite.

Distribution of authigenic "marine dolomite" is controlled by interrelated factors of (1) sedimentary facies, (2) surface relief, and (3) frequency of seawater flooding. These factors are in turn controlled by the pre-Holocene sand topography. Dolomitization is most extensive (to 100% dolomite) in buried, former intertidal sediments composed of an algal-laminated aragonitic mud facies and a burrowed aragonitic mud facies. Rocks in the latter facies are more completely dolomitized, probably because of their greater permeability. An underlying subtidal skeletal aragonitic mud facies is only partly dolomitized (5–15% dolomite).

The dolomitized buried facies attain their greatest areal distribution underlying elongate supratidal areas of low relief. These areas, because of their relief and orientation, are frequently flooded with sea-water resulting in input of brines with $^{m}Ca^{2+}/^{m}Mg^{2+}$ ratios > 30 for dolomitization. These supratidal areas of low