## DINNER MEETING—MAY 12, 1986

### CHARLES D. WINKER—Biographical Sketch

Charles D. Winker, a native of Chicago, attended Antioch College and the University of Georgia, where he received a B.S. degree in geology in 1977. In 1979 he received a M.A. degree in geology from the University of Texas at Austin, and was subsequently employed by the Bureau of Economic Geology and the Institute for Geophysics at the University of Texas.

Mr. Winker began work on his Ph.D. in 1981 at the University of Arizona, and is currently completing dissertation research on Neogene stratigraphy of the Salton Trough and history of the Colorado delta. Other research interests include Quaternary stratigraphy, geomorphology, and neotectonics of the Atlantic and Gulf Coastal plains, seismic stratigraphy of clastic and carbonate shelf margins, and tectonic evolution of the Gulf of Mexico basin and circum-Gulf Region.

### CLASTIC SHELF MARGIN TYPES WITHIN GULF OF MEXICO BASIN: IMPLICATIONS FOR DEEP-WATER SEDIMENTATION

Cenozoic and late Cretaceous clastic shelf margins of the circum-Gulf region can provide clues to the nature of associated deep-water slope sediments in the Gulf basin, and may help to explain the distribution of up to 8 km of post-Comanchean terrigenous sediment in the abyssal Gulf. At least four types of margins can be recognized, each with distinctive styles of slope stratigraphy.

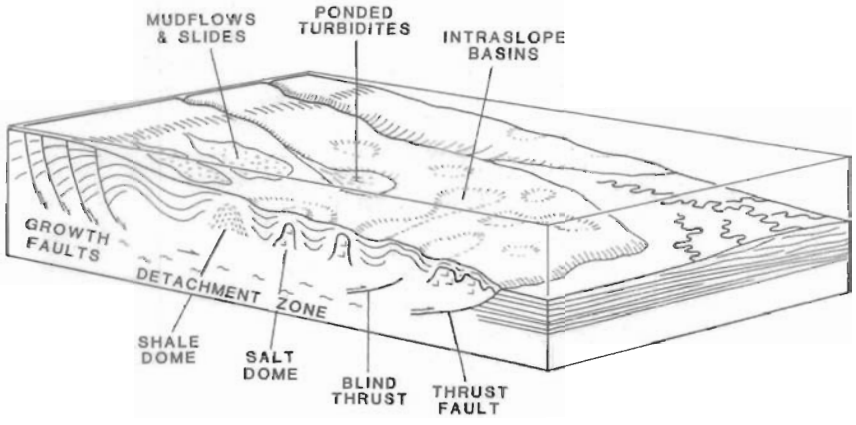
**Stable progradational margins** are characterized by oblique or sigmoid clinoform geometry; they are less common in the Gulf region than in many passive-margin basins. Basinward sediment transport is probably dominated by shallow-seated slope instability which can generate a variety of slides, slumps, mudflows, and turbidity currents. Sand bodies deposited on progradational slopes typically pinch out laterally and updip. True submarine fans located at the base of the slope and fed by discrete submarine canyons are also possible.

**Unstable progradational margins** result from deep-seated slope instability, which gives rise not only to the familiar high-expansion growth faults of the shelf margin, but also to a variety of fold and thrust structures ("toe structures") along the lower slope. Interaction of such structures with buoyant uplifts (salt and shale domes) gives rise to great structural complexity. Basinward translation of the continental slope "mud glacier" may shear off salt structures from their original base; alternatively, rising diapirs may uplift and deform inactive detachment surfaces. Active structures typically have strong bathymetric expression on the continental slope, and much of the sediment reworked downslope from the shelf margin may be trapped in closed depressions on the upper slope. The lower slope probably grows more by tectonic accretion (the "overthrust belt") than by sedimentation. A large volume of sediment may bypass the slope altogether via large submarine canyons such as the modern Mississippi canyon and ancient Yoakum canyon.

**Retrogradational shelf margins** may result from sediment starvation of rapidly subsiding margins, leading ultimately to transgressive shale wedges with bathyal fauna. Alternatively, retrogradation may result from erosional retreat of the upper slope, and deltaic and shelf sands may be reworked downslope into deep water. Erosional retrogradation is responsible for the Oligocene Hackberry sands, and was also widespread in east-central Mexico during the Eocene.

**High-relief sediment-bypassing margins** are common on tectonically active continental margins; the continental shelf is narrow or nonexistent. Most coarse sediment is transported directly to deep water. In the Gulf basin, the best-documented example is in the mid-Tertiary of the Veracruz Basin, where deep-water sediments onlap a channeled unconformity developed on the Laramide thrust belt. Similar margins were probably widespread along the Mexican Gulf Coast and in Cuba during the early Tertiary.

Isopach maps of post-Comanchean sediment in the abyssal Gulf show two dominant thickening patterns. Late Cretaceous to Paleogene sediments thicken mainly toward the west, suggesting derivation from retrogradational and high-relief-bypassing-margins of east-central Mexico during and shortly after the Laramide Orogeny. Neogene and Quaternary sediments thicken mainly toward the north and particularly toward the apex of the Mississippi Fan, suggesting derivation from submarine canyons associated with unstable progradational margins of the ancestral Mississippi deopcenter.




**UNSTABLE PROGRADATIONAL SHELF MARGIN & SLOPE**