

DEPOSITIONAL EPISODES: THEIR RELATIONSHIP TO QUATERNARY SEA-LEVEL FLUCTUATIONS IN THE GULF COAST REGION

DAVID E. FRAZIER
Esso Production Research Co.
Houston, Texas

ABSTRACT

The stratigraphic record yields evidence that each episode of clastic deposition has been of limited duration and that each has been preceded and followed by a significant hiatus. Evidence for alternations of deposition and nondeposition is readily apparent in the landward portions of Pleistocene sequences along the Gulf coast owing to the glaciostatic changes in sea level: evidence of alternations, although elusive, exists also in the basinward portions of these sequences. The concept of depositional episodes explains the significance and relationship of these alternating conditions throughout the basin for clastic Pleistocene sequences.

A depositional episode is the duration of time required for the sedimentation of a depositional sequence. The depositional sequence attributed to each depositional episode is composed of several discrete facies sequences. A facies sequence consists of either a single delta lobe within a deltaic complex or one of the several repetitive facies sequences deposited in an interdeltatic environment. A depositional event is the duration of time required for the development of a facies sequence.

Each depositional sequence indicates three phases of development. Deposits of the initial phase record a stillstand of the sea during which each of the rivers entering the basin prograded a succession of delta lobes and interdeltatic facies sequences. The second phase of development is recorded by the intercalation of clastic and organic floodplain deposits which accumulated on the newly formed coastal plain. The terminal phase is documented by sediments deposited during a period of instability when a marine transgression either continuously or intermittently forced estuarine conditions on the rivers entering the basin. Throughout the terminal transgression the finite zone of active deposition adjacent to the shoreline was shifted landward. Basinward of this active zone of deposition, hiatal conditions existed, and at the instant of maximum transgression, when the depositional episode was terminated, all points on the hiatal surface were synchronous.

The bounding surfaces of depositional sequences represent natural stratigraphic breaks and are related to hiatal conditions imposed by marine transgressions. Within the Quaternary section, the repetitive alternation of depositional episodes and significant hiatuses is due to the glaciostatic fluctuations of sea level; as a result, worldwide correlations of the Pleistocene sequences and hiatuses can be made.

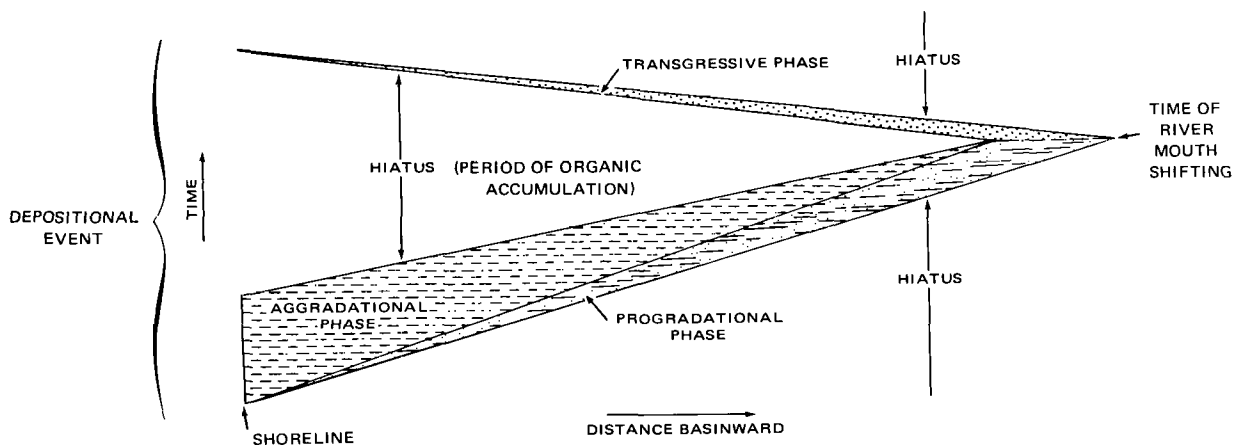


Figure 1. Typical Facies Sequence

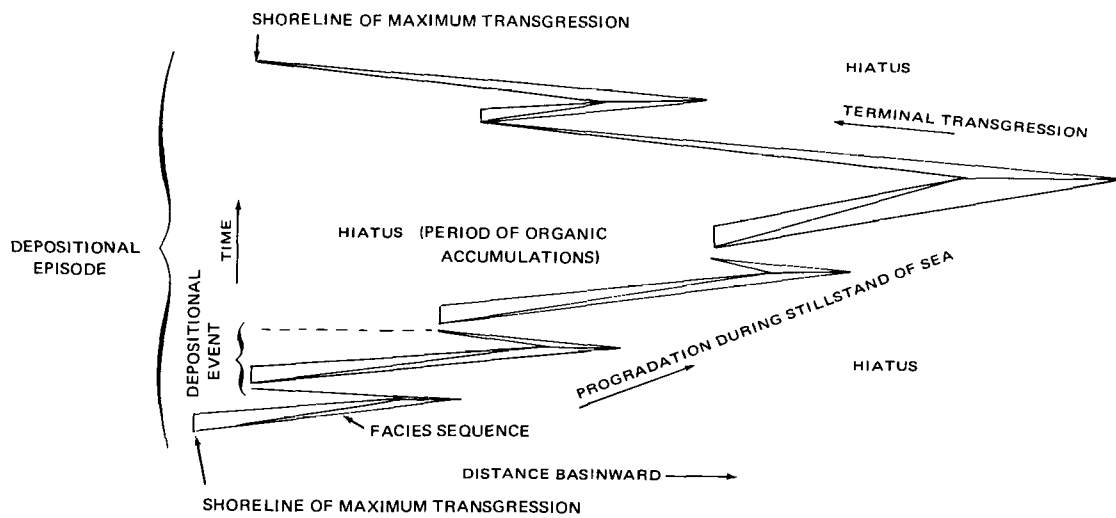


Figure 2. Typical Depositional Sequence

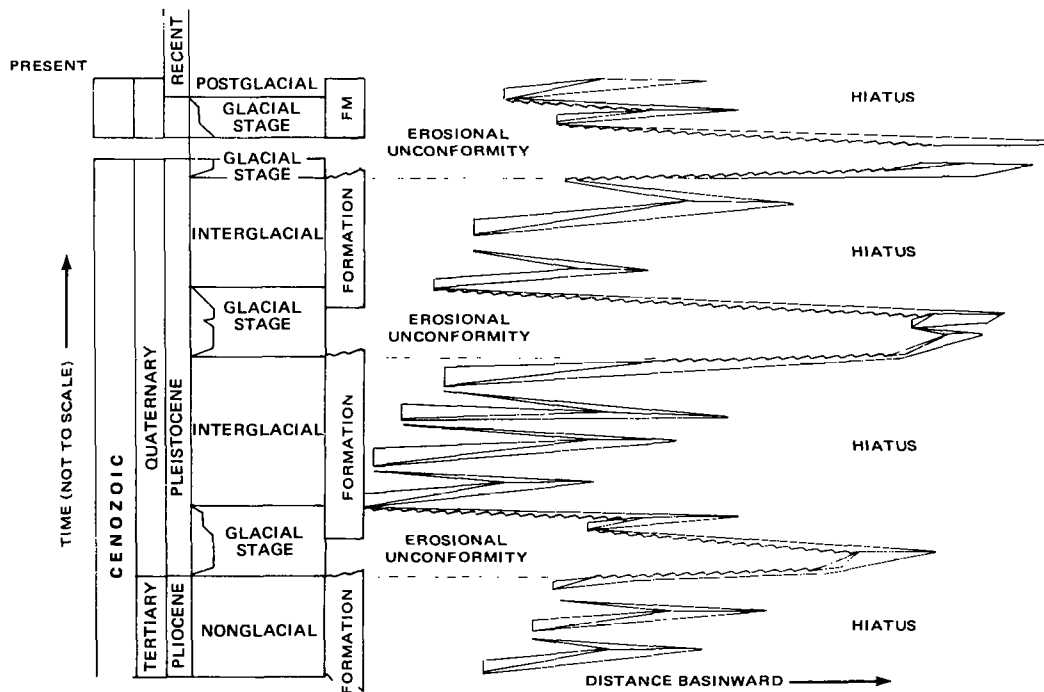


Figure 3. A broken series of glacially controlled depositional episodes depicting the relationship of depositional events to the Pliocene-Pleistocene boundary and the Pleistocene-Recent boundary and the relationship of Pleistocene formations to depositional sequences.