Definitions of sequence stratigraphy

Sequence stratigraphy (Posamentier et al., 1988; Van Wagoner, 1995): the study of rock relationships within a time-stratigraphic framework of repetitive, genetically related strata bounded by surfaces of erosion or nondeposition, or their correlative conformities.

Sequence stratigraphy (Galloway, 1989): the analysis of repetitive genetically related depositional units bounded in part by surfaces of nondeposition or erosion.

Sequence stratigraphy (Posamentier and Allen, 1999): the analysis of cyclic sedimentation patterns that are present in stratigraphic successions, as they develop in response to variations in sediment supply and space available for sediment to accumulate.

Sequence stratigraphy (Catuneanu, 2006): the analysis of the sedimentary response to changes in base level, and the depositional trends that emerge from the interplay of accommodation (space available for sediments to fill) and sedimentation.

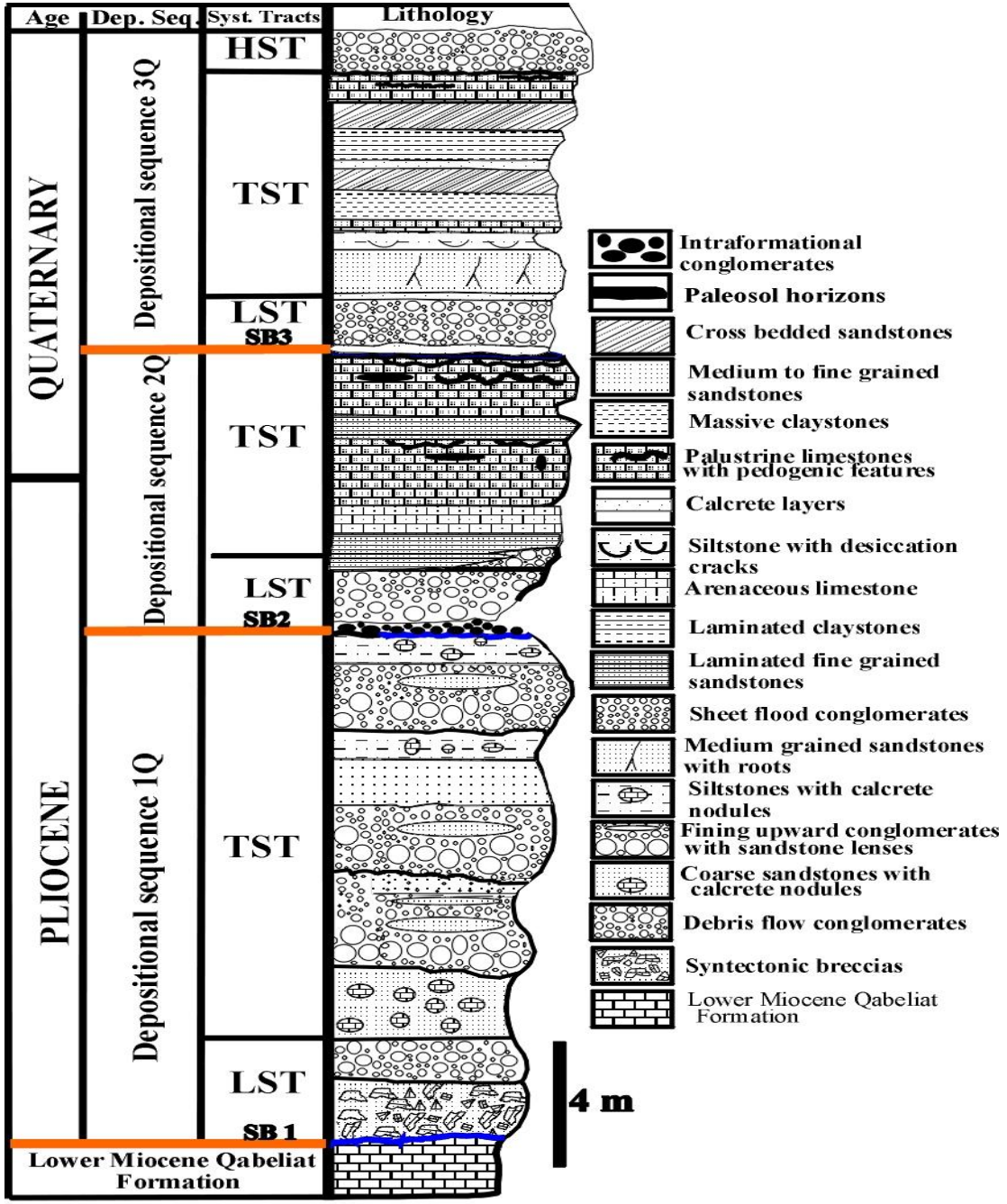
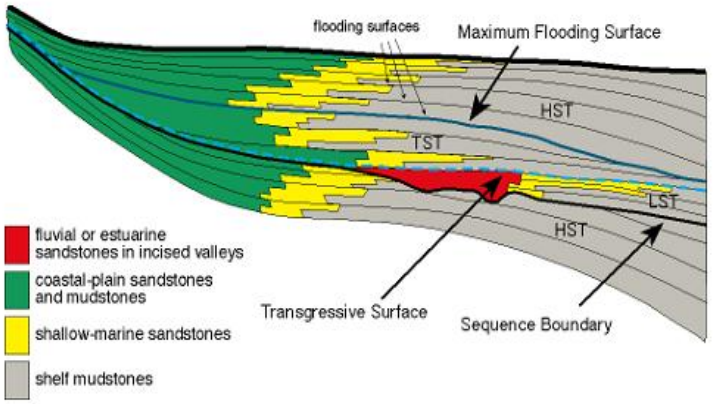


Fig. (6): Vertical section of Pliocene-Quaternary sediments showing the depositional sequences and systems tracts of El Qaa basin.

The key vertical succession in all depositional sequences:

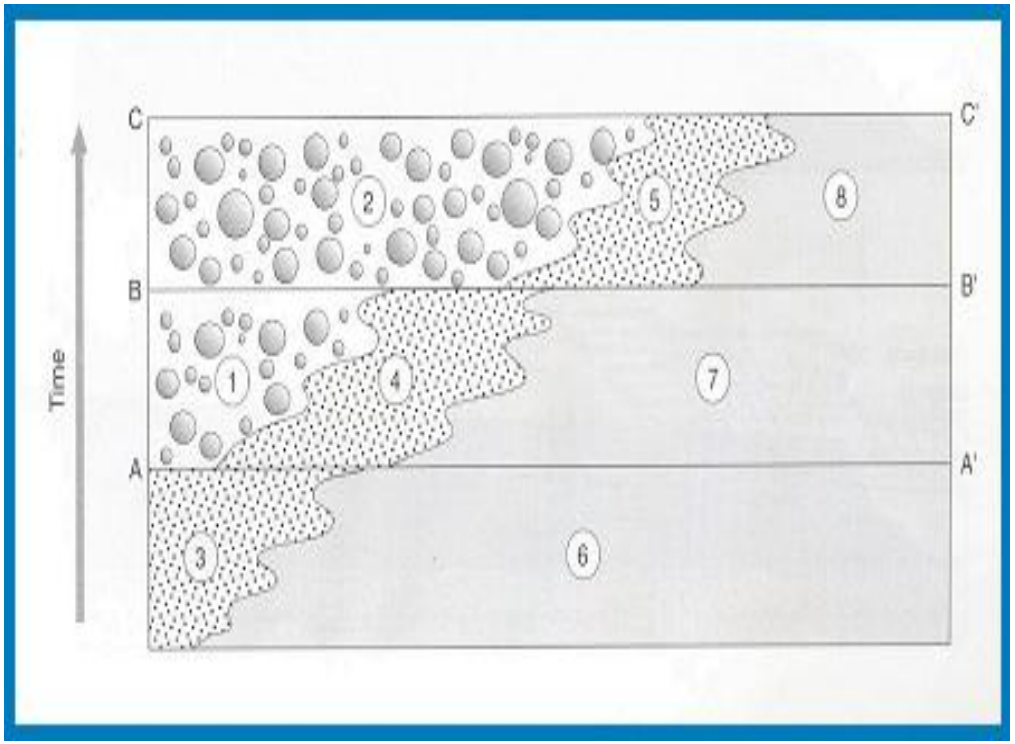


From bottom to top:

1) Sequence boundary
2) Low Stand system Track (LST)
3) Transgressive surface
4) Transgressive system track (TST)
5) Maximum flooding surface
6) Highs stand system track (HST)

Generally, Sequence Stratigraphy is the subdivision of sedimentary basin fills into genetic packages bounded by unconformities and their correlative conformities

Sequence Stratigraphy and Lithostratigraphy



- **Lithostratigraphy: Is the correlation of similar lithologist, which are commonly diachronous and have no time-significant. The difference between sequence stratigraphy, which has geologic time significance, and**

Lithostratigraphy which correlates rocks of similar type. A lithostratigraphic correlation would correlate conglomerate units 1 and 2, sandstone units 3, 4 and 5, and mudstone units 6, 7 and 8. A sequence stratigraphic correlation would correlate time lines A-A', B-B' and C-C'.

lithostratigraphy does not predict changes in lithologies, whereas with sequence stratigraphic one can predict subsurface lithological patterns and changes in permeability

Advantages of sequence stratigraphic analysis:

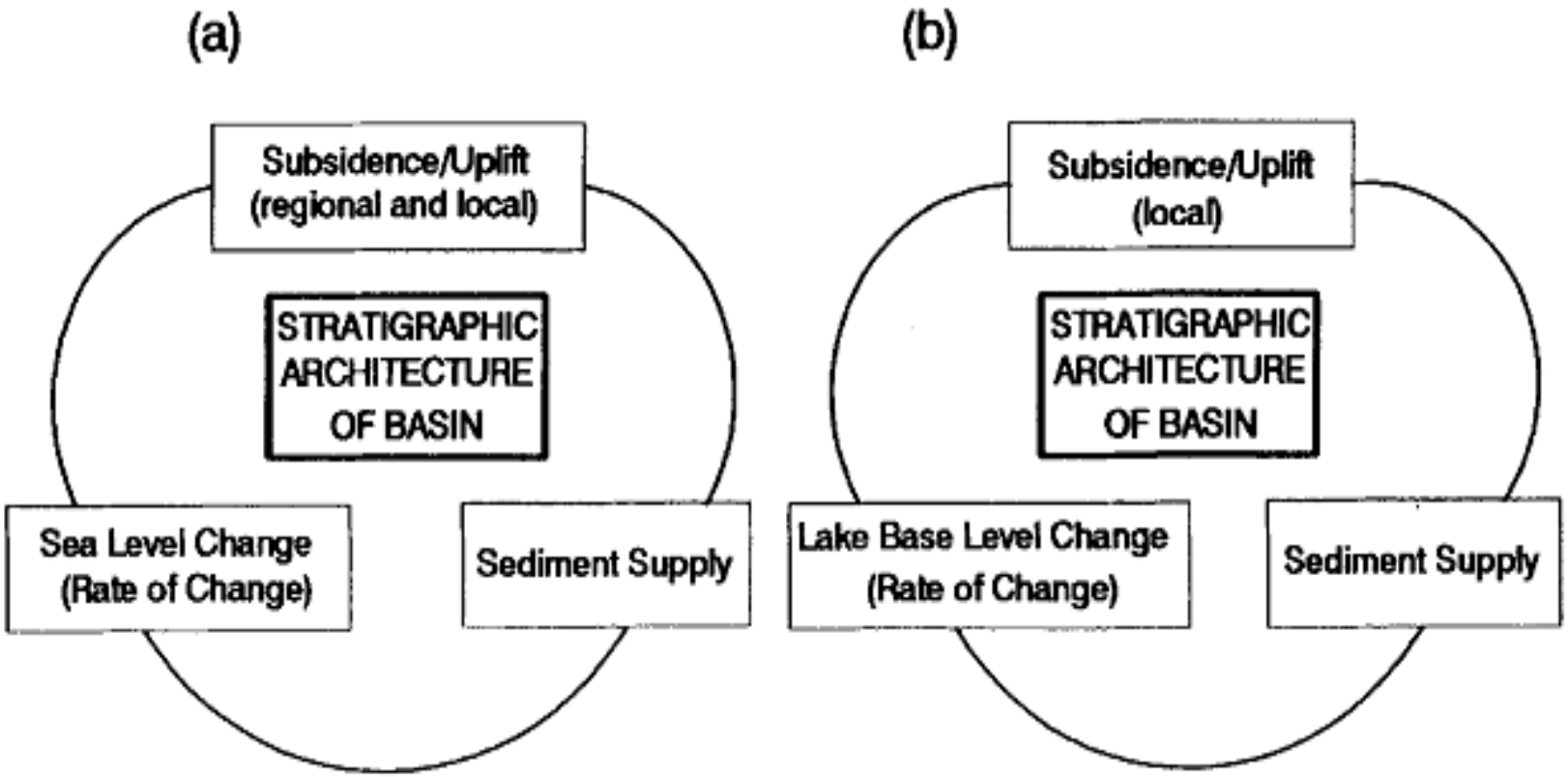
- **To try to understand and predict gaps (unconformities) in the sedimentary record.**
- **•To divide the sedimentary record into time-related genetic units, which are useful for Stratigraphical correlation and prediction of facies.**
- **•To obtain a holistic view of the distribution of sedimentary faciesin time and space.**
- **•To determine the amplitude and rates of past changes in sea-level, and so aid our**
- **understanding of the nature of crustal (e.g. fault movement, isostasy, ocean-floor spreading) and climatic processes operating in the past.**
- **•To help identify, classify and understand the complex hierarchy of sedimentary cycles in the stratigraphical record. Sequence stratigraphy is useful for analyzing cycles that range, in duration, from the 10 kato >50 Ma scale**

Concepts and Principles of Sequence Stratigraphy

- The stratal patterns in the sedimentary record are the results of
- Tectonics
- Eustasy
- **Climate, Tectonic and eustasy control the amount of space available for sediment to accumulate space available for sediment to accumulate (accommodation), and tectonics, eustasy, and (accommodation), and tectonics, eustasy, and climate interact to control sediment supply and climate interact to control sediment supply and how much of the accommodation is filled.**

Eustasy

- **Eustatic sea-level change may result from a change in the volume of sea water such as during periods of glaciation and deglaciation, or from a change in the shape of ocean basins as a result of plate tectonic processes, or by a combination of both mechanisms. Plate tectonic mechanisms are of sufficient duration and magnitude to account for first- and second-order cycles. Glaciation and deglaciation may result in**
- **third-order cycles and some second-order cycles (Vail et al. 1977b). Climatic changes recorded from isotopic changes and faunal evidence correlate with sea-level high stands---climatically warm conditions, and low stands---climatically cool conditions.**



. **1.** Controls on the stratigraphic architecture of (**a**) basins with a marine connection; and intermontane lacustrine basins.

Tectonism

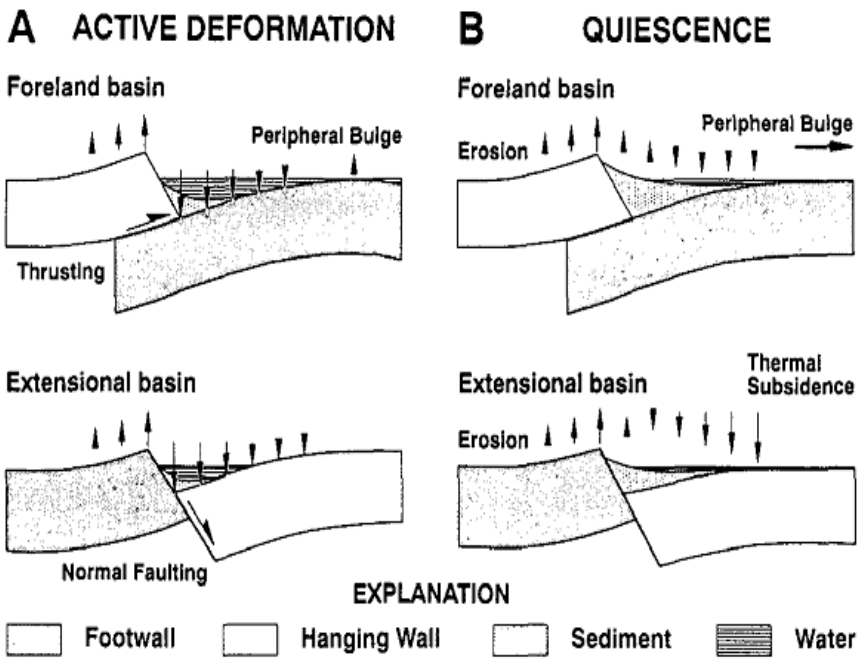


Figure 6 Schematic diagrams comparing patterns of uplift and subsidence in foreland and extensional basins during times of active deformation (*A*) and quiescence (*B*). See text for discussion.

- Tectonism represents the primary control on the creation and destruction of accommodation.. Without tectonic subsidence there is no sedimentary basins. It also influences the rate of sediment supply to basins.