

## A Proposed Bipartite Sequence Stratigraphic Nomenclature

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We propose a bipartite sequence stratigraphic nomenclature in order to accommodate the varied needs and practices of stratigraphers. The proposed scheme acknowledges a clear case for both descriptive and interpretive concepts, and for shared ownership of the term "sequence." Incorporation of the suggested nomenclature within the North American Stratigraphic Code will require a fundamental amendment of the Code.

**Sequence**—"a stratigraphic unit that is defined on the basis of bounding unconformities." An unconformity is a composite surface of erosion and/or nondeposition separating older from younger sediment or rock bodies.

Two types of sequence are recognized, one descriptive (*stratal sequence*), and the other interpretive, involving bounding unconformities of specific character (*depositional sequence*).

**Stratal sequence**—"a stratigraphic unit that is defined exclusively with reference to bounding unconformities without regard to their character."

**Depositional sequence**—"a relatively conformable succession of strata bounded by unconformities of subaerial erosion/nondeposition or their submarine equivalents and by genetically correlative conformities." The intent of this definition is to permit the extension of a depositional sequence beyond the point at which one or both boundaries cease to be unconformable. The interpretation of a depositional sequence does not require correlative conformities to be present within a particular area of study.

### Additional Remarks

The term *sequence* is sometimes used in a third sense, as a general designation for a sedimentary succession or stratigraphic unit (e.g., shoaling-upward sequence), and without reference to unconformities. Such usage is discouraged, particularly where confusion may arise with the more restrictive nomenclature proposed here. Alternatives, such as shoaling-upward succession, are available.

A *stratal sequence* is an unconformity-bounded unit equivalent to the synthem of Chang (1975) and Salvador (1987), and approximately equivalent to the allostratigraphic unit of the North American Commission on Stratigraphic Nomenclature (1983). An allostratigraphic unit is bounded by stratigraphic discontinuities that are commonly but not necessarily unconformities according to the way in which the term unconformity is conventionally used.

A *depositional sequence* is an unconformity-related unit, and essentially the sequence upon which modern sequence stratigraphy is based (Mitchum, 1977).

The proposed scheme departs in two important ways from the existing nomenclature of the North American Commission on Stratigraphic Nomenclature (1983). First, it specifically recognizes a category of stratigraphic unit that is defined on the basis of bounding surfaces rather than intrinsic material characteristics (e.g., lithology, remanent-magnetic properties, fossil content, etc.) or significance with respect to geological time (e.g., system, series, stage, etc.). In the present North American Stratigraphic Code, allostratigraphic units are classified out of necessity in the material unit category (see Table 1 of the Code). Moreover, while many sequences have time-stratigraphic significance, they are not defined as a material reference for a span of time (chronostratigraphic units); and the existence of diachronous unconformities precludes universal interpretation of chronostratigraphy using sequence stratigraphy. Second, the proposed nomenclature recognizes that sequence stratigraphy is fundamentally a procedure for interpreting patterns of sediment accumulation rather than a system for stratigraphic classification. *Stratal* sequences are similar to existing categories of stratigraphic unit in the North American Stratigraphic Code because their selection is a matter of convention; *depositional* sequences differ from all existing categories because any interpretation is potentially falsifiable (it is subject to the scientific method).

**Acknowledgment**

Recommendations outlined in this abstract are the product of extended discussions from 1995 to 2001 within the Working Group on Sequence Stratigraphy (International Subcommittee on Stratigraphic Classification of the International Commission on Stratigraphy). This abstract represents the consensus of nine of fifteen members of the Working Group.

**References**

- Chang, K.H., 1975, Unconformity-bounded stratigraphic units: Geological Society of America Bulletin, v. 86, p. 1544-1552.
- Mitchum, R.M., Jr., 1977, Seismic stratigraphy and global changes of sea level, part 11: Glossary of terms used in seismic stratigraphy, *in* Payton, C.E., ed., Seismic Stratigraphy—Applications to Hydrocarbon Exploration: American Association of Petroleum Geologists Memoir 26, p. 205-212.
- North American Commission on Stratigraphic Nomenclature, 1983, North American Stratigraphic Code: American Association of Petroleum Geologists Bulletin, v. 67, p. 841-875.
- Salvador, A., 1987, Unconformity-bounded stratigraphic units: Geological Society of America Bulletin, v. 98, p. 232-237.