

NORTH AMERICAN COMMISSION ON STRATIGRAPHIC NOMENCLATURE

Report 13 – Revision of Articles 25-27 of the North American Stratigraphic Code to Allow Formal Submembers

Carlton E. Brett¹, Brian R. Pratt² and Ed Landing³

¹Department of Geology, University of Cincinnati, Cincinnati, OH 45221-0013

²Department of Geological Sciences, University of Saskatchewan, Saskatoon, SK S7N 5E2, Canada

³New York State Museum, 222 Madison Avenue, Albany, NY 12230

email: carlton.brett@uc.edu

At the 74th Annual Meeting of the North American Commission on Stratigraphic Nomenclature, 23 September, 2019, in Phoenix, Arizona, the Commission voted unanimously to accept the revision of Articles 25-27 of the North American Stratigraphic Code (North American Commission on Stratigraphic Nomenclature, 2005), and concomitant changes to Table 2 and remarks in Articles 22, 23, and 30 printed below; specific revisions of the Code are indicated in red color. These replace all older versions of the specified Articles. An application for this revision (Brett et al. 2018) was published in *Stratigraphy* more than one year prior to the meeting; thus, the vote on this application for revision follows Article 21 of the Code.

This revision explicitly allows the use of submembers in formal lithostratigraphic nomenclature.

Article 25. — **Member.** A member is the formal lithostratigraphic unit next in rank below a formation and is always a part of some formation. It is recognized as a named entity within a formation because it possesses characteristics distinguishing it from adjacent parts of the formation. A formation need not be divided into members unless a useful purpose is served by doing so. Some formations may be divided completely into members; others may have only certain parts designated as members; still others may have no members. A member may extend laterally from one formation to another.

Remarks. (a) **Mapping of members.** — A member is established when it is advantageous to recognize a particular part of a heterogeneous formation. A member, whether formally or informally designated, need not be mappable at the scale required for formations. Even if all members of a formation are locally mappable, it does not follow that they should be raised to formational rank, because proliferation of formation names may obscure rather than clarify relations with other areas.

(b) **Lens and tongue.** — A geographically restricted member that terminates on all sides within a formation may be called a lens (lentil). A wedging member that extends outward beyond a formation or wedges (“pinches”) out within another formation may be called a tongue.

(c) **Organic reefs and carbonate mounds.**—Organic reefs and carbonate mounds may be distinguished formally, if desirable, as

members within a formation. For the requirements of formalization, see Article 30f.

(d) **Division of members.** — A formally or informally recognized division of a member composed of multiple beds is called a **submember**. **Members and submembers may be formally or informally divided into a bed or beds**, except for volcanic flow rocks, for which the smallest formal unit is a flow. Members may contain beds or flows, but may never contain other members. **Distinctive marker beds may be recognized within members without the need to subdivide into submembers.**

(e) **Laterally equivalent members.** — Although members normally are in vertical sequence, laterally equivalent parts of a formation that differ recognizably may also be considered members.

Article 26. — **Submember.** A submember is the lithostratigraphic unit next in rank below a member and is always a part of some member. It is recognized as a named entity within a member because it possesses characteristics distinguishing it from adjacent parts of the member. A member need not be divided into submembers unless a useful purpose is served by doing so. Some members may be divided completely into submembers; others may have only certain parts designated as submembers; still others may have no submembers. A submember may extend laterally from one member to another.

Remarks. (a) **Mapping of submembers.** — A submember is established when it is advantageous to recognize a particular part of a heterogeneous member. A submember, whether formally or informally designated, need not be mappable at the scale required for formations. Even if all submembers of a member are locally mappable, it does not follow that they should be raised to member or formation rank, because proliferation of names may obscure rather than clarify relations with other areas.

(b) **Division of submembers.** — A formally or informally recognized division of a submember is called a bed or beds, except for volcanic flow rocks, for which the smallest formal unit is a flow. Submembers may contain beds or flows, but may not contain other submembers. A member need not be divided into submembers in order to be divided into beds or flows.

Table 2. Categories and Ranks of Units Defined in This Code*

I. MATERIAL CATEGORIES BASED ON CONTENT OR PHYSICAL LIMITS					
LITHOSTRATIGRAPHIC	LITHODEMIC	MAGNETOPOLARITY	BIOSTRATIGRAPHIC	PEDOSTRATIGRAPHIC	ALLOSTRATIGRAPHIC
Supergroup	Supersuite	Polarity Superzone			Allogroup
Group	Suite				
<i>Formation</i>	<i>Lithodeme</i>	<i>Polarity Zone</i>	<i>Biozone</i> (Interval, Assemblage or Abundance)	<i>Geosol</i>	<i>Alloformation</i>
Member (or Lens, or Tongue)		Polarity Subzone	Subbiozone		Allomember
Submember					
Bed(s) or Flow(s)					

IIA. MATERIAL CATEGORIES USED TO DEFINE TEMPORAL SPANS		IIB. NON-MATERIAL CATEGORIES RELATED TO GEOLOGIC AGE			
CHRONO-STRATIGRAPHIC	POLARITY CHRONO-STRATIGRAPHIC	GEOCHRONOLOGIC	POLARITY CHRONOLOGIC	DIACHRONIC	GEOCHRONOMETRIC
Eonothem	Polarity Superchronozone	Eon	Polarity Superchron		Eon
Erathem (Supersystem)		Era (Superperiod)			Era (Superperiod)
<i>System</i> (Subsystem)	<i>Polarity Chronozone</i>	<i>Period</i> (Subperiod)	<i>Polarity Chron</i>	<i>Episode</i>	<i>Period</i> (Subperiod)
Series		Epoch		Diachron	Epoch
Stage (Substage)	Polarity Subchronozone	Age (Subage)	Polarity Subchron	Phase	Age (Subage)
Chronozone		Chron		Span	Chron
				Cline	

*Fundamental units are italicized.

Replacement for Table 2, page 1562, reflecting the insertion of Submember between the ranks of Member and Bed.

(c) **Laterally equivalent submembers.** — Although submembers normally are in vertical sequence, laterally equivalent parts of a member that differ lithologically from one another may also be considered submembers.

Article 27.—**Bed(s) and Flow(s).** A bed, or beds, is the smallest formal lithostratigraphic unit of sedimentary rocks. A flow is the smallest formal lithostratigraphic unit of volcanic flow rocks. A flow is a discrete, extrusive, volcanic rock body distinguishable by texture, composition, order of superposition, paleomagnetism, or other objective criteria. It is part of a member and thus is equivalent in rank to a bed or beds of sedimentary-rock classification.

Remarks. (a) **Limitations.** — The designation of a bed or a unit of beds as a formally named lithostratigraphic unit generally should be limited to certain distinctive beds whose recognition is particularly useful. Coal beds, oil sands, and other beds of economic importance commonly are named, but such units and their names usually are not a part of formal stratigraphic nomenclature (Articles 22g and 30g). The designation and naming of flows as formal rock-stratigraphic units should be limited to those that are distinctive and widespread. Many flows are informal units.

(b) **Key or marker beds.** — A key or marker bed is a thin bed of distinctive rock that is widely distributed. Such beds may be named, but usually are considered informal units. Individual key beds and individual flows may be traced beyond the lateral limits of a particular formal unit (Article 23c).

The addition of submembers requires a replacement table on p. 1562 with Submember inserted between the rank of Member and Bed(s).

The addition of submembers further requires minor changes to the remarks in Articles 22, 23, and 30, on pages 1566, p. 1567 and p. 1570, as follows.

p. 1566, Article 22, Remarks

(g) Economically exploited units. — Aquifers, oil sands, coalbeds, and quarry layers are, in general, informal units even though named. Some such units, however, may be recognized formally as beds, submembers, members, or formations because they are important in the elucidation of regional stratigraphy.

p. 1567, Article 23, Remarks

(c) **Key beds used for boundaries.** — Key beds (Article 27b) may be used as boundaries for a formal lithostratigraphic unit

where the internal lithic characteristics of the unit remain relatively constant. Even though bounding key beds may be traceable beyond the area of the diagnostic overall rock type, geographic extension of the lithostratigraphic unit bounded thereby is not necessarily justified. Where the rock between key beds becomes drastically different from that of the type locality, a new name should be applied (Figure 2E), even though the key beds are continuous (Article 27b). Stratigraphic and sedimentologic studies of stratigraphic units (usually informal) bounded by key beds may be very informative and useful, especially in subsurface work where the key beds may be recognized by their geophysical signatures. Such units, however, may be a kind of chronostratigraphic, rather than lithostratigraphic, unit (Article 75, 75c), although others are diachronous because one, or both, of the key beds are also diachronous.

p. 1570. Article 30. Remarks

(e) **Member and submember names.** — All member and submember names include a geographic term and the word “member” or “submember;” some have an intervening lithic designation, if useful; for example, Wedington Sandstone

Member of the Fayetteville Shale. Members and submembers designated solely by lithic character (for example, siliceous shale member), by position (upper, lower), or by letter or number, are informal.

ACKNOWLEDGMENTS

We appreciate the input and encouragement from Lucy Edwards and James Haggart in preparing this report.

REFERENCES

- BRETT, C. E., PRATT, B. R. and LANDING, E., 2018. NORTH AMERICAN COMMISSION ON STRATIGRAPHIC NOMENCLATURE Note 68 - Application for Addition of Submembers to the North American Stratigraphic Code: A Case for Formalizing Lithostratigraphic Units of Intermediate Rank. *Stratigraphy*, 15(2):103–108.
- NORTH AMERICAN COMMISSION ON STRATIGRAPHIC NOMENCLATURE, 2005. North American Stratigraphic Code, 2005. *American Association of Petroleum Geologists Bulletin*, 89:1547–1591.