PROPOSED SEDIMENT CLASSIFICATION SCHEME FOR CORENTER (CURATORS' DATABASE)

TERNARY (3-CLASS) SCHEME

Objective: Modify the ODP Sediment Classification scheme so that it may be reasonably applied to sediment descriptions in the NGDC/Curators database.

Approach

- Provide a simple, unambiguous, classification scheme to quickly characterize sediments.
- Be completely descriptive — base classification upon what can be seen (hand lens or petrographic microscope) without need to interpret provenance, depositional environment or geological history. (Provide encoders with a list of specific components assigned to each class to alleviate ambiguity.)
- Produce a computer generated sediment name that *fulfills the minimum standards* agreed to by the Curators' group.
- Define sediment types and sediment names to ensure consistent, meaningful using in Corenter text fields.

INTRODUCTION

The ODP classification scheme recognizes two basic sediment types (1) granular and (2) chemical sediment. The following addresses only the classification of **granular sediments**. Sediments containing more than 50% precipitates, recrystallized rock or carbonaceous sediments may be referred to the ODP chemical-sediment classification.

The 3-class classification is oriented to the description and classification of soft sediments, though it may be applied to broad categories of sedimentary rock (siltstone, limestone, chert). A more refined scheme, recognizing degree and type of compaction and recrystallization and other fabric characteristics is beyond the scope this simplified scheme.

Class Definitions and Naming Conventions

Three classes of granular sediments are recognized: **Biogenic, Glass** and **Mineral/Lithic.** These equate roughly to Pelagic, Volcaniclastic, and Siliciclastic classes, respectively, of Mazzullo, et al., (ODP classification), but are slightly redefined to create a wholly descriptive classification. (Although "Biogenic" implies organic origin, the distinction between fossil forms and mineral grains is usually clear and unambiguous. No prior knowledge or interpretation of provenance, depositional environment or geologic history is required to assign remains to the Biogenic class.)

1. **Biogenic (Pelagic and Neritic, in part, of Mazzullo, et al.) -** Comprises remains or traces of once-living organisms.

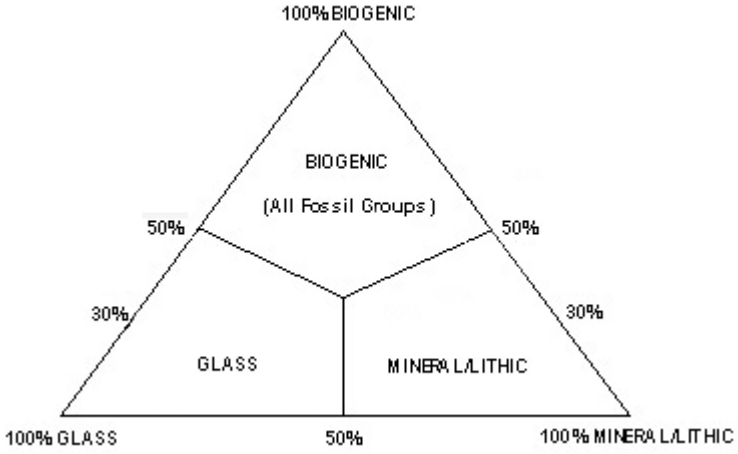
2. **Glass (Volcaniclastic, in part, of Mazzullo, et al.) -** Includes volcaniclastics and also tektites and other (man-made, extraterrestrial) glass.

3. **Mineral/Lithic Class (Siliciclastic, Neritic, in part, and possibly Volcaniclastic, in part, of Mazzullo, et al.) -** Includes all other (non-glass) mineral grains (clastic, authigenic and precipitate (less than 50%): i.e. siliciclastics, ferromagnesian, heavy, and opaque minerals, authigenic minerals and clay and isolated precipitates. Small rock fragments also fall into this class.

Neritic Class of Mazzullo, et al. - Dropped. This class does not fulfill the criterion of being purely descriptive. It also complicates the classification as describers would need to have additional expertise (and possibly additional equipment) to recognize rock fabric as defined by Dunham (1962). Lumping all the biogenic components into a single class creates a simple and unambiguous classification.

Mixed Sediments of Mazzullo, et al. Questionable. The term "mixed sediments" does not relay much information to the database user. The concept, however, seems valid, and perhaps even necessary, to characterized sediments with near-equal amounts of components from two or more classes. For example, to name a sediments comprising 45% foraminifers and 45% ash as either "foraminifer ooze" *or* "ash" would be inadequate. A possible solution is to recognize subclasses that would produce terms such as, "mixed biogenic/glass sediments" or "mixed foraminifer/ash sediments."

Ternary Diagrams —The three principal classes are defined by the Ternary Diagram (1).



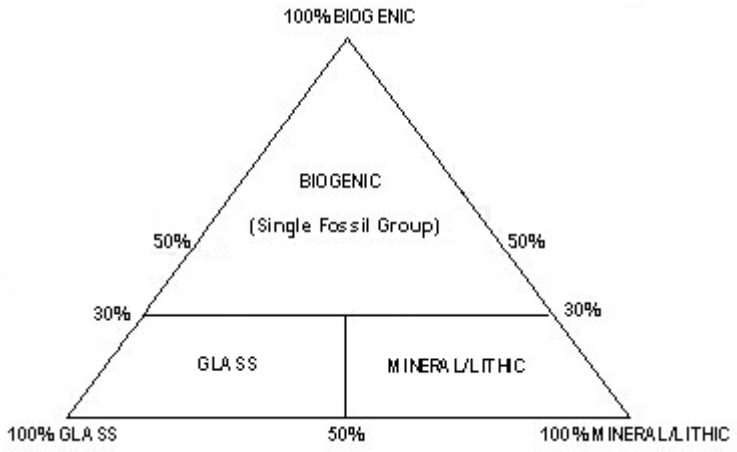
Principal Names of the Three Major Classes

BIOGENIC CLASS	GLASS CLASS	MINERAL/LITHIC CLASS
Ooze	Ash/Shard	Sand
Chalk	Lapilli	Silt
Limestone	Tuff	Clay
Hash	Breccia	Sandy silt
Radilarite	Spherules	Sandy clay
Spiculite		Silty sand
Diatomite		Silty clay
Spiculite		Clayey sand
"Silt"		Clayey silt
"Sand"		Sand/silt/clay
		(Nodules)

Add "stone" if lithified.

Ternary Diagram 1. Principal Classes.

If a single fossil group comprises at least 30%, the sediment is classed as Biogenic to adhere to traditional usage. Ternary Diagram 2 would apply in this case.



Ternary Diagram 2. A single fossil group comprises more than 30%.

Naming Structure

Naming structure follows the general conventions of the Marzzullo et al., (ODP classification).

Principal name is derived by (a) determining which class the sample falls into on the basis of percentage of major components (example, "Biogenic," (b) selecting a fossil or lithotype from within that class (example, Diatom) and (3) selecting the appropriate name from the list unique to that class (example, "ooze," = **Diatom ooze**. An example from the Mineralithic Class is "**Siliciclastic silty clay**."

A **major modifier** (more than 25% of the sediment) may precede the principal name. Example **Clayey** radiolarian ooze.

A **minor modifier(s)** (10 -25% of the sediment) may follow the principal name. Examples: Clayey radiolarian ooze **with sponge spicules** or volcaniclastic ash **with foraminifers and sponge spicules**.

(Because only 30% of a single biogenic component is required for the principal name, more than 15% qualifies as a major modifier and 5-15% qualifies as a minor modifier.)

Use grain-size classes after Wentworth (1922) and Shepard's (1954) ternary diagram to determine Mineral/Lithic class name as given in Mazzullo's ODP classification.

Modifiers for the Comment Field: Further descriptive detail involving grain fabric, degree of recrystallization, sphericity and roundness of grains, can be added in the "Comment Field."

Data Input Into Corenter

To provide minimum descriptive data to the user of the Curators' Database, I suggest

- revamping of the current computer-generated name to provide minimum acceptable descriptive name. Present the level of detail as seen in the current NGDC format (major component + principal name = "biosiliceous ooze").

- encoding via pop-up lists as given (with replaced class names) by Steve Carey (6-29-00) to produce a computer-generated name

- providing an (optional) text column for long-hand entry of sediment name (as defined by the accepted classification scheme). This would allow greater flexibility and detail in sediment name/characterization as a supplement the computer generated name. More detailed descriptions, could also, of course, be placed in the Comment Field.

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