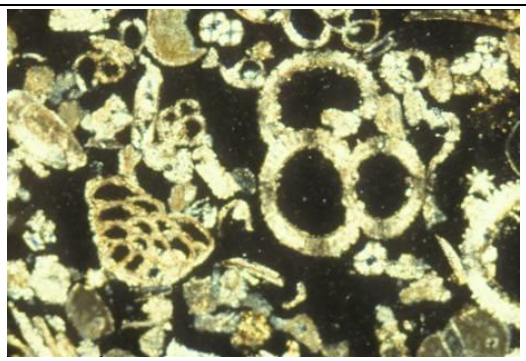
What Counts as Carbonate for the dbSEABED Mappings?

CJ Jenkins
INSTAAR Univ Colorado, Boulder USA



Introduction.
An application of dbSEABED data is production of 'carbonate' mappings. The common definition of carbonate for paleoceanographic and ocean-acidification purposes is calcium carbonate ($CaCO_3$, calcite, aragonite; "https://en.wikipedia.org/wiki/Calcium_carbonate"). Determinations are usually made by acid-dissolution / ignition combined with gravimetry / coulometry.

Exclusions.
This definition excludes several lithologies which geologically are classed as 'carbonates' and occur at the ocean floor – dolomite, siderite, celestite, rhodochrosite. In the dbSEABED dictionary these are marked as 'undetermined' calcium carbonate percentages, and will not register for oceanographic purposes. However, they are marked by their mineral names, and with proper interrogation dbSEABED outputs will map their presences.

For fossil materials, many plankton and benthic remains are composed of calcium carbonate: foraminifera, coccoliths, pteropods, corals, molluscs, brachiopods, bryozoan, echinoderms, calcareous algae. These are included in the materials assigned a carbonate percentage (virtually 100%), but there are rare exceptions. Primarily those are records of macro- 'fossils' where the remains may be replaced with another material such as silica, or is only a cast/mould composed of the matrix lithology. In the dictionary, remains which are marked simply 'fossil' are given no indication of calcium carbonate percentages.

Examples of terms in the dictionary which are not specific enough to be counted as carbonate are "biogenic", "sand", "concretion", "planktic", "cement". On the other hand "skeletal debris" and its relatives can safely be counted as carbonate.

Main materials.
Bulk carbonate-bearing sediments are assigned $CaCO_3$ percentages based on classification values such as from Mazzullo et al. (2008), or from experience including purposed calibrations.

In dbSEABED the performance of a description can be tested and compared to co-occurring analytical values and that is a calibration of both the dictionary entries and the dbSEABED software parser. Finally, the performance of the whole dictionary-software-calibration is graphically inspected, and passed for mappings if satisfactory.

Reference.
Mazzullo, J. & Graham, A.G. (Eds.), 1988. Handbook for shipboard sedimentologists. *ODP Tech. Note,* 8.