

THE ACCUMULATION OF SEDIMENTS IN THE OPEN OCEAN

A. Types of Deep-Sea Sediments:

Great expanses of ocean floor receive practically no sediment except the microscopic-size particles which float in the open ocean. These are called pelagic particles (floating in open sea), and the sediment is often called "deep sea ooze," calcareous ooze, siliceous ooze, Globigerina ooze, etc. (The word "ooze" refers to its extremely fine-grained nature.)

There are 2 main types:

1. Pelagic clay.

Many of these clay particles float for years before finally coming to rest on the bottom, so the accumulation rate is very slow. A high % of clay particles are less than 1μ diameter. ($1\mu = 0.001$ mm) (A micron is also now called a micro-meter, i. e., 1 millionth of a meter, written μ m).

51 years of time are required for a clay particle of 1μ size to settle through 4 km depth of tranquil sea water--longer for agitated sea water of course. (This is figured by Stoke's equation--Stoke's Law.) cf.

attached Xerox p. 119 from M. G. Gross, Oceanography, Prentice Hall, 1972.

2. The skeletal parts of mineral-secreting microorganisms.

Some of these secrete calcareous shells; others siliceous:

(a) Foraminifera and coccolithophores--calcareous

(b) Diatoms, Radiolaria, and silicoflagellates--siliceous

When the shells and skeletal parts of these microorganisms are discarded by the organisms, they begin their slow settling journey to the bottom. Many of these parts are only a few microns in diameter, so they settle very slowly through the water.

(c) As for the rates of settling:

Large particles settle faster than small ones.

For particles whose diameter is less than 200μ (0.2 mm), the settling speed is predicted by Stoke's law ^{of settling}. A 10μ particle (the size of a medium to small coccolith) requires 185 days for 4 km of water.