solidation of undisturbed frozen cores from several locations are of considerable interest. Although most frozen soils tested contained freshwater ice, some plastic silt and clay samples containing significant quantities of brine also were tested. The latter samples were obtained at Kotzebue and Point Barrow, Alaska.

The writer shows the identity between the consolidation theory advanced by Terzaghi for thawed soils, using void ratios, and the relation between frozen and thawed dry unit weight of soils. On the basis of this identity, one may estimate quantitatively the total settlement from information in single boreholes and the differential settlement between 2 or more adjacent borings. There also are methods for building in ice-rich permafrost areas, including methods of preserving the frozen state or pre-thawing and consolidating.

DARBY, DENNIS A., Dept. Geol. and Geophys., Univ. Wisconsin, Madison, Wisc.

CARBONATE CYCLES IN ARCTIC OCEAN SEDIMENT CORES

Gasometric determination of the carbonate fraction from generally continuous intervals of cores from the Canada basin and Alpha Cordillera reveal as many as 18 significant fluctuations during the past 3 m.y. The duration and number of these cyclic carbonate fluctuations are very similar to those reported from the equatorial Pacific. However, carbonate peaks in the Arctic sediment cores do not correlate with faunal increases as they do in the Pacific. Poor correlation between carbonate peaks and organic carbon content also suggests that these peaks are not caused by increases in organic productivity. Examination of the coarser fraction associated with the carbonate layers indicates that detrital calcite and dolomite are present. One possible explanation for the increase of detrital carbonate during the Pleistocene could be periodic lowering of sea level which would expose carbonate outcrops of the continental shelf to ice plucking. If so, such events may be correlated with Pleistocene events elsewhere.

DAWES, PETER R., Geol. Survey Greenland, Copenhagen, Denmark, and N. J. SOPER, Dept. Geology, Univ. Sheffield, Sheffield, England

PRE-QUATERNARY GEOLOGY OF NORTH GREENLAND

In North Greenland a geologic section is present that contains Precambrian crystalline basement, and strata of Precambrian, early Paleozoic, late Paleozoic, Mesozoic, and Tertiary strata.

The crystalline basement, which is exposed at places adjacent to the Inland Ice, is overlain with angular unconformity by the late Precambrian to early Paleozoic sedimentary section. These sediments have a gentle north dip and comprise a large platform area that extends from the west to the east coast. The oldest sedimentary formation of this platform (the Inuiteq Sø Formation) is at least 1,000 m.y. old, and the youngest strata are late Wenlockian-early Ludlovian. The lower Paleozoic strata, if traced northward, are part of the North Greenland fold belt, which occupies an approximately E-W-trending zone of folds and metamorphic rocks along the extreme northern coast of Greenland. In Peary Land, where the broadest section across the folded zone is exposed, metamorphic and deformational effects increase northward.

In eastern Peary Land, the folded Cambrian, Ordovician, and Silurian sediments are overlain unconformably by less severely deformed Pennsylvanian, Permian, Triassic, and Cretaceous-Tertiary strata. This younger cover shows the effects of Tertiary earth movements. In northern Peary Land, a bedded sequence of dominantly rhyolitic lava and tuff (the Kap Washington Group) crops out. These volcanic rocks post-date the main Paleozoic diastrophism of the surrounding metasediments, but are affected by later folding and thrusting. A minimum K-Ar age of 35 m.y. has been obtained from the lavas.

The metasediments of the North Greenland fold belt have been subjected to a complex structural and metamorphic history, which is not completely understood. Two distinct periods of deformation and metamorphism can be recognized: Paleozoic (between Late Silurian and Late Devonian times) and Cretaceous-Tertiary. Paleozoic orogenesis involved polyphase deformation in northern Peary Land with the second- and third-order folds facing northward, toward the assumed interior of the orogen. Cretaceous K-Ar ages of the metamorphic rocks suggest a subsequent thermal episode which produced Abukuma-type mineral assemblages, but no structural events can be assigned to this period. Tertiary movements are indicated by the northward thrusting of the metamorphic rocks over the Kap Washington Group, with accompanying mylonitization.

DEMENITSKAYA, R. M., YU. G. KISELEV, G. I. GAPONENKO, and S. S. IVANOV, Research Inst. Geol. of Arctic, Leningrad, USSR

FEATURES OF SEDIMENTARY COVER OF ARCTIC OCEAN

1. The part of the earth's crust surrounded by three large pre-Paleozoic platforms (the eastern European, middle Siberian, and Greenland-Canadian) is the Arctic basin, and the presence of these 3 platforms was the initial basis for the origin and development of the Arctic Ocean. The existence of these platforms and their surrounding fold belts created conditions favorable for sedimentary accumulation in the inner regions of the ocean.

2. The various sedimentary frameworks in different parts of the ocean show the different types of tectonic movements that affected the area, and indicate specifically the history of reconstruction of the former continental features into oceanic ones.

3. Oceanic margins—the regions of the present shelf—represent, according to tectonic data, vast parageosynclinal basins nearly of isometric shape, composed of thick sedimentary layers of different ages and structures. In a west-east direction one may observe the successive rejuvenation of the sedimentary cover and the progressive decrease in the degree of consolidation of the cover sediments.

4. The sedimentary framework of the eastern sector of the inner Arctic Ocean basin differs from that of the western sector. A double stage structure of the sedimentary sequence is typical for the eastern sector of the Arctic Ocean basin. Unconsolidated sediments with seismic velocity values of 1.6–2.5 km/sec are everywhere underlain by consolidated rocks with velocity values of about 3.5–4.5 km/sec. In the western Arctic basin, the unconsolidated sediments overlie either relict folded basement with seismic velocity values of 5.0–6.0 km/sec, or basaltic basement with seismic velocity values of 6.3–6.7 km/sec.

5. In large arched uplifts, the thickness of unconsoli-