
Mössbauer Spectroscopic Study of the Iron Mineralogy of Post-Glacial Marine Clays

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Abstract: Three post-glacial marine clays from eastern Canada and one marine clay from Japan have been studied by Mössbauer spectroscopy to ascertain their iron mineralogy. Small amounts of hematite (in two samples) and magnetite (in one sample) were found in the Canadian clays, and hematite was detected in the Japanese clay. The major spectral components were ferrous and ferric doublets, consistent with X-ray powder diffraction results that show chlorite, mica, and amphibole in the Canadian samples and smectite in the Japanese sample. Citrate-dithionite extraction removed hematite and most of the magnetite from these samples. Acid-base extraction also removed chlorite and some mica from the Canadian samples. Samples treated by these extractions had appreciably lower geotechnical yield stresses at given water contents.

Key Words: Hematite • Iron • Magnetite • Mössbauer spectroscopy • Quick clay • Smectite • Yield strength

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