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Progressive change of Clay microstructure during burial consolidation

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Progressive change of microfabrics of deep-sea sediments during early diagenesis was analyzed using two drill cores collected from the Sites U1305 and U1306 of the Integrated Ocean Drilling Program Expedition 303 in the Labrador Sea in the northwest Atlantic Ocean. Microfabrics were analyzed by scanning electron microscope and micro X-ray CT (SP-microCT). Different microfabrics in three layers were distinguished in both cores: Surface layer-1 with general void ratio $>$ 2.5, subjacent layer-2 with void ratio 2.5 ? 1.5, and deep layer-3 with void ratio $<$ 1.5. Microfabrics of the sediments changes downward (toward deeper part), as well as magnetic susceptibility anisotropy. Microfabrics in the surface layer-1 is non-directional and characterized by the presence of many macropores larger than 10 micron meters in diameter. Clay platelets in this layer are linked to each other with edge-to-edge or high-angle edge-to-face (EF) contact. In the underlying layer-2, contact relations of clay platelets change to low angle EF type. Coarse siliciclastic fractions of this layer show horizontal preferred orientation, most probably due to overloading. Sizes of macropores decrease to several micron meters in diameter. In the lowest layer-3, clay platelets take horizontal preferred orientation to form shaly texture, according to further compaction. In conclusion, it can be said that the microfabrics of deep-sea sediments was quickly evolved to take horizontal, parallel preferred orientation by burial compaction, as far as concerned the sediments of the Labrador Sea floor. Furthermore, I will show an example of microfabrics around Japan.

Keywords: Scanning Electron Microscope, X-ray CT, Anisotropy of Magnetic Susceptibility, Freeze-Dry, Thin section