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Bioturbation coefficients of deep-sea sediments from polymetallic nodule fields of the Clarion-Clipperton Fracture Zone

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In the marine environment, the exploitation of deep-sea resources, such as the mining of manganese nodules, will disturb the sea floor and impact the natural deep-sea ecosystem. The biogeochemical milieu will be altered by resuspension of sediment, the release of chemically active substances, and resettlement of the sediment. Quantification of the bioturbation, therefore, is an important parameter in investigation of geochemical processes induced by anthropogenic activities within the deep-sea sediment. Here we present bioturbation rates in deep-sea sediments from the polymetallic nodule fields of the Clarion-Clipperton Fracture Zone (Pacific, 14°N - 130°W) at 5000 m depth. The present work is part of the French Nodinaut cruise which focused on manganese nodule fields on an attempt to quantify the potential impact of deep-sea mining on the ecosystem. We concentrate on two sets of samples: - sediments on different nodule facies (multicorer cores) and - deep-sea disturbed sediments from a former dredge trace (26 years ago, submersible cores).Gamma spectrometry was used to measure simultaneously Pb-210 and Ra-226. Additional alpha countings, after radiochemistry, allowed the determination of Pb-210 to check gamma counting efficiency, and long half-live radionuclides (U-238, Th-232, Th-230) to determine sedimentation rates. Sedimentation rates are extremely low, a few millimeters per kyears, as expected for deep-sea sediments. Therefore the penetration of unsupported Pb-210 within the upper few cm of sediments is mainly ascribable to bioturbation. Penetration depths of Pb-210 in excess in dredge-trace sediments did not appear to differ from undisturbed sediments, suggesting that bioturbation rates had recovered to back-

ground levels. Bioturbation rates range between 0.01 and 0.1 cm2 per year, with the highest value observed in the facies where nodules are the most abundant.