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Th-230 – excess and Pa - 231 excess geochronology of manganese nodules

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The geological age of a manganese nodule, collected from the Clarion-Clipperton abyssal plane of the North Pacific Region, at a depth of 4500 m, has been determined by means of Th-230 - excess and Pa-231 - excess radiometric methods.

The distribution of the alpha activity over a transverse section of the nodule has been recorded by using a CR 37 solid tracks detector, while the concentration of the Pa-231 fissile element have been achieved, for the same section, following neutron irradiation, by means of a muscovite detectors. For a better accuracy in determining the tracks density, the entire area of both detectors was investigated by scanning electron microscopy. Resulting maps, free of artifacts, showed a maximum tracks density on the nodule surface, gradually decreasing towards the center.

By taking into account the radial distribution of tracks, for the external layer of nodule, we have calculated an average growth rate of 20.0 ± 1.5 mm/Ma.

At the same time, more details concerning our experimental techniques, as well as the peculiarities of tracks distribution in correlation with radiographic and optic images of the investigated section, are presented and discussed.