Mineralogy and geochemistry of the ferromanganese nodules of Baltic Sea

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We investigated ferromanganese nodules (FMN) of the shelf zone of Baltic Sea. The complex of research mineralogical techniques included XRD analysis, X-Ray spectroscopy, DTA, Mössbauer spectroscopy and investigations of samples in a natural state and after high-temperature heating.

The inner structure of FMN is zonal and determined by distribution of ore and impurity minerals around the FMN nuclei. Distinct boundaries between zones are indicated the changing of physical and chemical conditions of the water and sediment environment in which they are formed.

Sometimes zone ordering is disturbed by inclusions of quartz, feldspars or presence of grey-coloured alevritic material consisted of kaolinite-galite mixture. FMN surface have dark-brown colour, sometimes grey one up to white because of coating of kaolinite and galite which occurs sometimes in the form of zones inside nodules.

By results of XRD analysis it was established that in initial samples Mn-containing minerals (birnessite, vernadite, asbolane, Mn_2O_3) are present. Fe- containing phases are non-crystalline. Results of the thermal analysis have shown change of a structural state of the ferriferous phases – FMN components. On the DTA curves clear endothermic effect at 220-230°C caused by loss of loosely-coupled water is present. Weight loss at 700-900°C is connected with formation of magnetic iron phases. According to the Mössbauer spectroscopy under heating γ-FeOOH at first and then another Fe-Mn-oxide phase transformed into new Fe phases with sextet magnetic structure of a spectrum. On the basis of electron microscopic investigations we can propose that lamination of Fe-Mn minerals provided capture of radioactive particles in consequence of high active area and to enough hollow space in frame structure. High sorption properties of FMN of the shelf zone of Baltic Sea allow to use them as indicators of environmental changes for ecological monitoring.

Ediacaran glaciogenic diamictite in Keguerqin mountain range of Xinjiang, China: Geochemistry and paleoenvironmental evolution

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There are three Neoproterozoic glaciogenic diamictite successions occur in the east-west oriented Keguerqin Mountain Range of Xinjiang, China. The most upper diamictite succession, Talisayi Formation, composed of three diamictite horizons and two shale-siltstone interlayers should be related to Ediacaran glaciation because it is just laid under the lower Cambrian dolomite (Linkuanggou Formation) and on the Neoproterozoic clastic sediments (Tarchart Formation, with a Rb-Sr whole-rock isochron age 640 ± 33 Ma). Geochemical profile research of matrix of diamictite, shale-siltstone interlayers and the lower Cambrian dolomite show that the contents of organic carbon and values of $P_2O_5/Al_2O_3\times100$ sharply increase from average 0.14% and 3.23 in Talisayi Formation to 0.61% and 8.58 in the lower Cambrian dolomite respectively, going with a $\delta^{13}C$ positive excursion both of carbonate and organic carbon. This variation could reflect increasing nutrition input and organic matter burial rate by enhanced biomass and continental weathering during the translation of P-C. Paired carbonate and organic carbon isotope determinations of 16 samples from around the Ediacaran-Cambrian boundary in the profile and cited model calculation [1,2,3] reveals that atmospheric CO_2 concentration could acutely fluctuate during the terminal Neoproterozoic to early Cambrian. pCO_2 of atmosphere tended to decrease to 400-600 ppmv in glaciation and reversed to increase continuously to more than 1300 ppmv at the terminal Neoproterozoic era, and then, sharply down to about 650 ppmv in early Cambrian.

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[1] Bidigare *et al*. (1997) *Glob. Bio. Cycles,* **11**, 279-292.
[2] Bidigare *et al*. (1999) *Glob. Bio. Cycles,***13**, 251-252.
[3] Kump *et al*. (1999) *Chem. Geol.* **161**, 181–198.