SOURCES OF ORE ELEMENTS SUPPLY IN TO FERROMANGANESE FORMATIONS OF THE RIDGE INVESTIGATOR (THE INDIAN OCEAN)

V. NIKULIN[2], N. FEDORONCHUK[2], B. VANSHTEYN[1]
1 – VNIIOkeangeologiya, Anglyisky props.,1, St.Petersburg, 190121, Russia, fax: 007-812-1141470
2 – Odessa National University, Shampansky str., 2, Odessa, 65058, Ukraine, e-mail: marine@paco.net

Under the scale of eolian suspension components supply in to deposits of investigated area is equal to 5 mcg/cm^2 in 1000 years, inr 20 Ma this source had provided maximum 0,1 g of matter per square centimetre of a bottom. The biogenic component of sediments forms not more than 40 % for subcarbonate (foraminiferous), and the same for ethmodiscous silts. One can easily fine, that biogenic and terrigenous mechanisms of delivery of substance in deposits do not ensure the observed volume of pelagic sediments in the region.

The main source of provided delivery of substance in to deposits are altered oceanic basalts that is proved by the character of lateral distribution, chemical and mineral composition of adjournment.

Halmyrolytic processes in basalts get gradually a prevailing role. In the initial stage of spreading, when fresh basalts are still within rift area, the subtraction of chemical compounds and elements from host rocks take place due to hydrothermal processes (within the frames of a circulating water cell). However, as far basalts move out from the ridge area, the role of low temperature alterating processes is growing and developing due to penetration of sea water. Subtraction of magnesium and calcium and hydratation of initial minerals take place in course of basalts alteration where montmorillonite with content of 7% Fe_2O_3 (previously 20%) is forming (Nikulin et al., 1995). Due to high tetrahedral charge, montmorillonite is capable to fix intensively potassium from seawater. Intensive palagonitisation of a great bulk of glasses takes place. It promotes losses of main ore substance from fracture zones and subsequent input in to benthonic waters. These elements tends to move from benthonic waters in result of different physical and chemical processes in to pore water, and then in to deposits (Piven et al., 1986).

Overwhelming majority of extracted elements are transported on rather small distances – first tens of kilometres. The range of transport is adjusted basically by hydrodynamical features of a benthonic water layer.

The quantity of the matter taken from basalts depends on duration of basalts exposal at the ocean's floor, capacity of deposits and sedimentary breeds above them (rate of denudation), speeds and temperatures of benthonic currents, the areas of vertical contact with seawater and on some other factors.

The micronodules are the important component of deposits of studied area. Many researchers have an opinion that micronodules form a matrix for creation of ferromanganese nodules. The amount of ore component in micronodules of deposits changes in an interval 56,77 - 83,85 %. The ore component plays a leading role in autigenic microformations of clays and medium silts, whereas in fine-medium grained subcarbonate silts the ratio between ore and nonmetallic parts is almost different. Thus, it is possible to isolate elements that where supplied in to micronodules due to dissolution of carbonate remainders. Micronodules from carbonate silts have minimum content of nickel and copper in its ore part and maximum of iron and cobalt whereas compositions of manganese and zinc are insignificant. Nickel and copper are supplied in to micronodules (as the most equilibrium formations) in result of carbonate detritus dissolution lower than level of critical depth of carbonate accumulation. The content of manganese and zinc, as well as of iron and cobalt does not grow after carbonate dissolution.

While analysing the correlation of ore elements content in ore and ore-free parts of micronodules, one can see that dominating part of them is in the ore part with exception of iron that contained mainly in clayey minerals and sorbed by matrix silica of micronodules. The full identity of micronodules compositions of Investigator Ridge and depositions of the Central basin of the Indian Ocean have been revealed under comparison.

The analysis of elements distribution in micronodules versus depth of deposition in a section of bottom sediments allowed to make a conclusion on constancy of accumulation rate of their alumosilicates components and related elements in time. It showed also unevenness of hydrogenous elements (Mn, Mg etc.) supply in to micronodules.

REFERENCES

1. P.I.Piven, P.A.Vaganov, V.A.Mayer, B.G.Vanstein, L.I.Anikeeva, S.I.Andreev. The connection of nodules morphology and chemical composition with that of host sediments. Vestnik LGU, v. 1. 1986.pp. 91-95 (in Russian).
2. V.V.Nikulin, S.A.Astafurova. Micronodules of the West Australian Basin. Abstr. of XI session of marine geology. – Mosow, 1995.p. 145 (in Russian).