Chronology of seafloor massive sulfides: New evidence of hydrothermal systems evolution

GEORGY CHERKASHOV[12], VLAD KUZNETSOV[2] AND TAMARA STEPANOVA[1]

[1]VNIIOkeangeologia [gcherkashov@gmail.com]
[2]SPbSU [v_kuzya@mail.ru]

The chronology of the hydrothermal activity and ore forming processes during the last 300-350 kyr can be evaluated applying the radiometric 230Th/U dating of seafloor massive sulfide (SMS) deposits [1].

Collection of 200 SMS samples from the Northern Equatorial part of the Mid-Atlantic Ridge (MAR) has been dated. Minerals, base and rare metals have been determined in this collection of sulfide samples as well.

As a result of joint analysis of geochronological, mineralogical and chemical data the cycles of ore-forming activity during the life time of the oceanic hydrothermal system was determined.

The full-range cycle of different temperature stages of SMS deposit formation is represented by the following sulfide mineral associations:

- Isocubanite - pyrrhotite (first - high temperature stage)
- Chalcopyrite - high Fe sphalerite (second - middle temperature stage)
- Low Fe sphalerite - marcasite (third - low temperature stage)

The timing and duration of each stage and cycle as a whole have been determined for the evolution of hydrothermal systems at the MAR during last 170 kyr.

[1] Kuznetsov V., Tabuns E., Kuksa K., Cherkashov G., Maksimov F., Bel'tenev V., Lazareva L., Zherebtsov I., Grigoriev V., Baranova N. The oldest seafloor massive sulfide deposits at the Mid-Atlantic ridge: 230Th/U chronology and composition // Geochronometria. 2015. doi: 10.1515/geochr-2015-0009