Method for measurement of argon isotopes in helium flow for K/Ar geochronology

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We present a method for the measurement of argon isotopes in the potassium-argon (K/Ar) geochronology of the controller based on the series (conventional) mass spectrometer operating in dynamic mode. Installation for the quantitative measurement of isotopes of argon laser system has a sample preparation, based on CO_2 laser, where the isolation and purification of argon is in a continuous flow of ultra-pure helium. The system is based on the mass spectrometer MAT-253 (Thermo Scientific), equipped with the detectors Faraday m/z 36, 37, 38, 39 and 40 and use chromatographic purification system.

Instead of the traditional method of isotope dilution of 38-argon method is comparing the signals from the sample gas and gas-standard of known isotopic composition (by air) before and after the measurement of each sample. This method, using of air argon as the reference gas has an advantage over conventional method of 38-Ar isotopic dilution : there is no contamination of the sample by $^{40}Ar/^{36}Ar$ incoming from a tracer 38-argon ; a quantity of argon in a dose is invariable for several years; availability of 40Ar/36Ar air ratio monitoring by reference gas.

A sample is placed in multi-charge chamber. The chamber contains 10 to 35 samples, depending on the size. To release the argon from a sample the CO_2 laser is used. The gas that was released during fusing, primary treatment is the U-shaped trap, placed in liquid nitrogen. Next argon helium flow passes through the capillary chromatography column for purification of argon from contaminants.

This method is an alternative method for measuring the argon isotopes in the static mode and can be used for analysis of radiogenic argon N * 10^{-12} g with the same sensitivity and accuracy, the method is simpler and more reliable. Small amounts of radiogenic argon extracted from geological samples require high stability, low backgrounds, minimal content of argon in the blank experiment, and high sensitivity of the isotope ratio mass spectrometer.

The presented method has been successfully used to solve geological, geochronological and geoarsheological issues.

[1] Ignatiev A.V *et al*. Laser CF-MS technique Ar isotopes measurement for K/Ar geochronology // JESIUM-2008. SFIS. France, 2008. P. 58

GIS mapping of geological features of the Baikal mountain region based on integrated geochemical indicators

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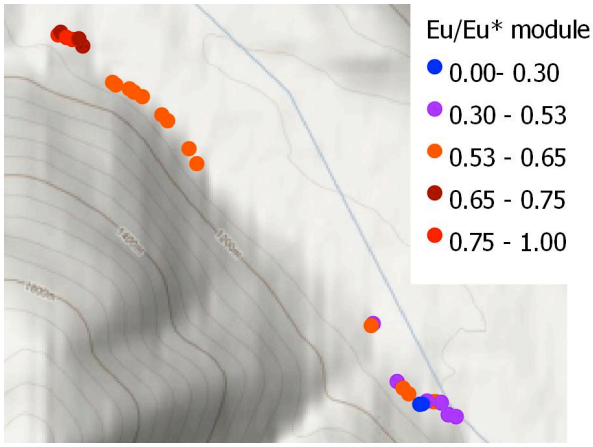
Baikal mountainous area and Kodar-Udokan structural-formational zone are perspective to search for deposits of noble and rare metals. The studies 2009-2012, the authors created a spatial database including geological and geochemical information for the various objects of the ore zone. For the analysis of this information is required to cartographically display more than 50 layers of geochemical data. Classical overlay-based GIS representation of such a large data set makes it difficult visual analysis. The authors found some mathematical and geographical distribution patterns of useful component that allowed the development of mathematical tools, providing spatial calculations of integrated geochemical indicators - "modules", which are comprehensive indicators of certain ore-forming processes. Form of their representation is suitable for GIS-mapping.



For example, the figure shows the calculation of Eu/Eu * module. Well traced the species change of rocks of different stratigraphic levels, to lying on each other. This approach provides the ability to make geological conclusions, based on visual analysis of only 5-7 data overlays. Created GIS software can serve as a navigator geochemical exploration.

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