U-Pb, Ar-Ar isotopic dating of Kalba-Narym polychronic batholith (East Kazakhstan)

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Kalba-Narym granitoid batholith located on the territory of East Kazakhstan. Batholith has a polychronic structure and is composed of rocks of five intrusive complexes, which differ in composition and formation time [1].

Results of U-Pb and Ar-Ar granitoids complexes isotopic dating are:1) kunush plagiogranite complex (U-Pb, Zrc - 306±9, 299±2 Ma); 2) kalguta association of Bt-Grt-granodiorites and Hbl-granite (Ar-Ar, Hbl (2 dates) - 286±3 Ma, Bt - 272±1 Ma); 3) Kalba granodiorite-granite complex (Ar-Ar, Bt - 5 dates from 291 to 273 Ma); 4) monastyr leucogranite complex (U-Pb, Zrc - 284±4 Ma, Ar-Ar, Bt - 6 dates from 285 to 269 Ma); 5) kainda granite complex (Ar-Ar, Bt - 5 dates from 290 to 267 Ma).

Obtained results allow us to determine the maximum duration of formation of Kalba-Narym batholith at ~ 30 million years. The formation of the main volume of granitoids occurred during a short interval - no more than 10 million years (290-280 Ma), which corresponds to most of the Ar-Ar dates. Younger Ar-Ar dates from 280 to 270 Ma can be interpreted as the result of later disbalance in K-Ar isotopic system because the north-eastern part of the batholith is adjacent to a major fault - Irtysh shear zone, within which the fixed stages of tectonic activity are 280-275 Ma and 270-265 Ma[2].

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Geochemistry of sediments from the Khai River – Nha Trang Bay estuarine system, South China Sea

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The Khai River and the Nha Trang Bay form one of the major estuarine systems in the South China Sea that is inhabited by unique biota. This area now experiences a significant anthropogenic load from the local people activities and, especially, from the quickly growing tourist industry.

Trace (Cr, Ni, Cd, V, Zn, Cu, Pb, Sb, Bi, Sn, Ag, Li, Co, As, Zr, Mo, Hg), minor (Mn) and major (Al, Fe, Ti, Mg, Ca, Na, K) along with nutrients (TOC, TS, TP) and TIC were first determined in surface sediment samples from the Khai River and Nha Trang Bay along the salinity gradient.

According to the sediment quality guidelines and reference background values data on the shale, pelagic clays, average river bed sediments and rural and industrial Vietnamese soils most of the element contents that were studied were below the threshold levels, while the content of Cu, Pb, Ni and, especially Ag exceeded significantly the hazardous levels in the most of the samples from the Nha Trang Bay.

Aluminum normalization and Spearman correlation analysis revealed some specific features in distribution of elements along the salinity gradient. Thus, Ca, Ba and Sr are largely dependent on the carbonates content in sediments. Sedimentary P, Al, Fe, Mn, Ti, Na, K, Li, Co, Cs, Zn and V are most likely controlled by the accumulation of their fine grained aluminosilicate host minerals and therefore tend to increase seaward. The contents of S, As, Sn, Bi, U, Cd and Mo are slightly elevated in sediments of estuarine part of the river – sea transect. These elements may be scavenged by and/or co-precipitated with the dissolved and particulate materials of the river discharge and further deposited on the geochemical barrier within the river – sea water mixing zone.

The distribution of Ni, Cr, Zr, Cu, Pb, Sb, Hg and, especially, Ag was characterized by anomalous high concentrations in the urban area of river-sea transect. This might be due to the point anthropogenic pollution from local human activities, i.e., fishing, shipping, fueling, and waste and sewage sludge outflow. The anthropogenic and/or environmental sources of Ag in the region need special study.

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