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New application of U-Th-He method: direct dating of pyrite from metaturbidites of the Western Taimyr

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U-Th-He dating of pyrite recently was successfully applied to dating the ore-forming processes in VMS type deposit [1]. Herein for the first time we applied this method for the direct dating of pyrite from metaturbidites of Western Taimyr.

The study rocks are located in Khutudin-Bolshevik fold belt, which is part of the Taimyr – Severnaya Zemlya Fold and Thrust Belt. The Khutudin-Bolshevik fold belt consists of clastic rocks interpreted as continental slope turbidites, which were dislocated and metamorphosed to greenschist facies. The turbidites are composed from sandstone to argillite. According to the granulometric composition turbidites are distal.

The large pyrite grains (1.5 x1.5 cm) were manually extracted from specimens of aleurolite and argillite (Malaya Skalistaya and Dioritova rivers) for U-Th-He dating. Pyrite does not show any evidence of deformation which suggests their metamorphic origin. Samples were manually crushed. 1-2 mm sized fragments were checked for the absence of mineral inclusions under the optical microscope. U-Th-He dating was conducted by the methodology described in [1].

Concentration of U and Th in the studied samples is up to 2 ppm and 3 ppm respectively. Concentration of ^{4}He is up to 6 x $10^{-5}cm^{3}/g$ STP, which corresponds to the age of ~ 190 Ma. The obtained age value is close to the age of last tectonic activity in the region. Thus, our preliminary results indicate that U-Th-He dating of metamorphic pyrite is possible, which opens a new perspective for dating tectonic processes.

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[1] Yakubovich et al. (2020), Minerals, 10, 629.