

X-ray computed microtomography of diamondiferous impact suevitic breccia and clast-poor melt rock from the Kara astrobleme (Pay-Khoy, Russia)

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ABSTRACT

X-ray computed microtomography (CT) of impact rock varieties from the Kara astrobleme is used to test the method's ability to identify the morphology and distribution of the rock components. Three types of suevitic breccias, clast-poor melt rock, and a melt clast from a suevite were studied with a spatial resolution of 24 μm to assess CT data values of 3D structure and components of the impactites. The purpose is first to reconstruct pore space, morphology, and distribution of all distinguishable crystallized melt, clastic components, and carbon products of impact metamorphism, including the impact glasses, after-coal diamonds, and other carbon phases. Second, the data are applied to analyze the morphology and distribution of aluminosilicate and sulfide components in the melt and suevitic breccias. The technical limitations of the CT measurements applied to the Kara impactites are discussed. Because of the similar chemical composition of the aluminosilicate matrix, glasses, and some lithic and crystal clasts, these components are hard to distinguish in tomograms. The carbonaceous matter has absorption characteristics close to air, so the pores and carbonaceous inclusions appear similar. However, X-ray microtomography could be used to prove the differences between the studied types of suevites from the Kara astrobleme using structural-textural features of the whole rock, porosity, and the distributions of carbonates and sulfides.

Keywords: X-ray computed tomography, impactites, impact melt rocks, impact glasses, suevites, Kara astrobleme