

Main types of weathering crust of the east of the Russian plate and its mineralogical-geochemical characteristic

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ABSTRACT

The long continental period in the east of Russian plate (the upper Proterozoic – the middle Devonian) caused formation of the weathering crust on the crystalline basement rocks. Over the weathering crust is blocked by rocks of a sedimentary cover of Devonian, Carboniferous, Permian and Cainozoic age with thickness from 1500 to 2500 m. In the geological and tectonic relation the research area is localized within the Tatar arch - massive structure of the east of the Russian plate. The object of the research is geological and core material of the numerous deep wells drilled within the territory of the Tatar arch. Data of the research testify that weathering crust formation proceeded as a result of consecutive change of weathering processes: disintegration, hydration, leaching, hydrolysis, oxidation. Therefore, zonal distribution of the crust is established on existence and transition from the bottom up a profile of weathering zones that are various on a mineral and chemical composition: disintegration, cementation, hydration and leaching, oxidation, zone of secondary hydration. Migration of some components on a weathering profile is also established. For example, in the top zones there was an aluminium oxide accumulation and carrying out of iron, alkaline and alkaline earth metals. Other feature of the core formation of this region is development of an incomplete core profile which is in most cases presented only by the lower zones. In pre-Devonian time due to the washing-out and the subsequent processes of redeposition of substance two types of weathering crust were formed: displaced and non-displaced. As a result the thickness of areal crust with the reduced weathering profile varies for different sites of the Tatar arch: from 1,0-5,0 m in the central parts to 20,0-25,0 m on the periphery of the Southern Tatar arch. Development of the linear type of the weathering crust with a thickness more than 50,0 m is also indicative for this region and is connected with zones of the basement faults of various degree. The widespread weathering crust of the crystalline basement of the east of Russian plate is the unique object for studying of the mineral forming processes of ancient weathering. Such crust contains an important information which can be used for climatic, tectonic and geographical reconstruction of the past of the earth crust. Besides, rocks of the weathering crust have higher filtration and capacitive properties and oil evidences that allows to refer them to nonconventional reservoir zones of big depths. Complex mineralogical and geochemical studying of the weathering crust is of an important practical value for creation of full picture of development of deep horizons of earth crust and forecasting of mineral deposits.

Key words: Weathering crust; crystalline basement; Tatar arch.

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