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# Weathering Geochemical Processes in Black Shale Critical Zone on the Northern Margin of Yangtze Platform, China

○Wei WEI, Xiyong WU, Sixiang LING, Xiaoning LI

Regolith and Bedrock samples of a black shale weathering profile of the Cambrian Terreneuvian Shuijingtuo Formation in Dabashan area was systematically collected to analyze the mineralogy, major and trace elements and Sr isotopic compositions by XRD, SEM-EDS, XRF and ICP-MS, aiming at revealing the geochemical weathering processes in black shale critical zone. The results show that the black shale weathering profile is in initial to medium weathering stages with CIA values of 54.45~75.50 and has experienced a typical continental weathering trend. The porosity and $^{87}Sr/^{86}Sr$ ratios of weathering profile show an increasing trend with weathering degree increasing. The results suggest that pyrite was oxidized to Fe (hydr)oxide during black shale weathering with strong depletion of S, Mn, Cd, Co, Ni, Zn and As. Plagioclase and muscovite were altered to illite, accompanied by the leaching of Na, Ca, K, Mg, Li, Sr and Ba. Elements Si, Al, Fe, P, Zr, Hf, Ta, Th and Rb were prone to retain in the weathering profile. The depletion of Si, Mg, Na and K in the micro-fracture zone was mainly affected by the differential weathering, while the geochemical anomalies of Si, Mg, Na, K, P and Fe in the fault zone was jointly controlled by the differential weathering and elemental re-sedimentation. Elements S, Ba and Cu are obviously enriched in the regolith-saprock interface, the micro-fracture zone, the transition zone of strong and weak weathering layers, and the fault zone, which was related to the precipitation of barite and copper sulfate. The enrichment of other trace elements in the fault zone was controlled by the adsorption of Fe-Mn species and kaolinite. In summary, the geochemical processes during black shale weathering mainly included the oxidation of pyrite, the dissolution of calcite, the decomposition of plagioclase and mica, and the transformation of illite to kaolinite, which dominantly controlled the release, transpotation and redistribution of most major and trace elements.