

Proxies for chemical weathering: Plio/Pleistocene red clay deposits from Hungary

J. KOVÁCS^{1*}, B. RAUCSIK¹, G. ÚJVÁRI², A. VARGA¹
AND G. VARGA³

¹Department of Geology, University of Pécs, H-7633 Pécs,
Hungary (*correspondence: jones@gamma.ttk.pte.hu,
raucsik.bela@gmail.com, andrea.varga.geol@gmail.com)

²Geodetic and Geophysical Research Institute, HAS, H-9400
Sopron, Hungary (ujvari@ggki.hu)

³Dept. Geomorphology & Quaternary Research, HAS, H-1112
Budapest, Hungary (eoliandust@gmail.com)

Introduction

Red clays in Hungary (Tengelic Red Clay Formation: TRCF; Kerecsend Red Clay Formation: KRCF) is overlain by loess paleosol sequences. The red clay sediments in the Carpathian Basin are known from both exposures and boreholes. The age of these formations is ~3.5–0.5 Ma.

Nature of clay mineral assemblages is primarily a function of climate, essentially affected by the length of time of weathering, slope, water-rock ratio, and water chemistry. Therefore, clay mineralogy, and geochemistry are considered to be a powerful tool for interpreting weathering conditions and paleoclimate.

Elemental oxide analyses of red clays were determined by x-ray fluorescence (XRF), and x-ray powder diffraction (XRD) was used for mineral identification. In this study, we aim to determine the changes of clay minerals due to chemical weathering and age.

Results

The older type (Beremend Mb, age: 3.3–2.4 Ma) of the TRCF is red kaolinitic clay containing typically disordered kaolinite, mixed-layer smectite/kaolinite, smectite and little gibbsite. It was formed in the local subaerial weathering crust in warm, humid, subtropical or monsoon climate. The younger member of the TRCF (age: 2.5–1.0 Ma) contains red (or 'reddish') clay beds. It contains relatively fresh material (illite, chlorite), the weathering products are predominantly smectite and goethite formed under warm and dry climate in environmental conditions of savannah and steppe or forest steppe. The basal red clay layers of the Paks Loess Fm. and KRCF (age: 1.7–0.5 Ma) contain similar material as the underlying red clays belonging to the younger member of the TRCF. The slightly but significantly lesser degree of weathering (more illite and chlorite, less smectite) indicates cooling of the climate.

The epithermal deposits as a potential source of Critical High-Tech Metals (Ga, Ge, In, Sb)

V.A. KOVALENKER

IGEM RAS, Russia, Moscow, 119017, Staromonetny per. 35
(kva@igem.ru)

In the recent evidences arise that some so-called 'Critical High-Tech Metals' of epithermal deposits are not only of academic interest. It is primarily concerns Sb and In which minerals in a number of deposits are appreciably accumulated. The IS-type epithermal deposits of Au-Ag-base metal usually accumulated in large of ore clusters (e.g. deposits Mexico, Peru, Romania, Serbia, Slovakia) can be considered as the potential source of Sb, produced by tetrahedrite - one of the main ore minerals. Some other deposits of this type (e.g. Tayoha, Goka in Japan, Prasolovskoe in Kunashir Island, Russia, etc) are enriched with In that is presented both, in the minerals (roquesite, sakuraiite, petrukite, and unnamed Zn-Fe-Ag-Cu-Sn-In-sulfides), and of high concentrations in sphalerite as well. In gold epithermal deposits of HS-type (e.g. Chelopech, Radka in Bulgaria) presence of Indium is provided mainly by high (to 4.7 wt. %) concentration in a sphalerite, unlike to rare roquesite. These and other similar deposits contain minerals of Ge (renierite, germanite, briartite, unnamed Cu-Fe-As-Ge-minerals) and Ga (gallite), as well. It is note, that considerable (to the first wt. %) concentrations of Ga are related to sphalerite too.

Thus contrary to existing conceptions that epithermal deposits mainly produce Au, Ag, as well as in some cases also Cu, Pb, Zn, some of these deposits already should be considered as byproducts sources of scarce rare, so-called Critical High-Tech Metals, such as Sb, In, Ge and, possibly Ga. While Sb, Ge, and Ga are more characteristic for IS-type deposits, In can accumulated in both types of epithermal mineralization.

This work was supported by ONZ RAS project 2-2 and RFBR project 10-05-00354.