Palaeoweathering chemistry of some flood basalt hosted fossil soils and their palaeoclimatic significance

M. R. G. SAYYED

Department of Geology, Poona College, Camp, Pune 411 001, India (mrgsayyed@yahoo.com)

Ancient soils have been largely used to understand the palaeoclimates because the chemical weathering was in response to the contemporaneous reactions between the meteoric water equilibrated with the atmospheric gases and the protoliths. The present paper attempts to compare chemical weathering patterns of the fossil interbasaltic soils (from the published geochemical data) from some flood basalt provinces. These include from Late Triassic Ischigualasto basin (NW Argentina), end-Cretaceous Deccan Traps (India), British Tertiary Basaltic Province and Tertiary lavas of Northern Ireland. The published geochemical data of the basalts and modern soils (Mumbai) developed upon them from Deccan Traps have been used for comparison. In general the CIA values do not show many variations from the Deccan boles but if studied from two spatially separated areas they have appreciable differences; the Ischiguasto palaeosols, however, show a wide range of CIA values. The higher CIA values in the Skye and Mull boles from British Tertiary basaltic province, than the Deccan boles, indicate their quite intensive weathering conditions while Tertiary interbasaltic formation of Northern Ireland conspicuously shows very high CIA values, indicating highly intense and/or prolong chemical weathering. Hydrolysis show good correlation with MAP and CIA but the Tertiary interbasaltic formation shows exceptionally higher hydrolysis. When plotted on the triangular diagrams the Deccan boles and the Tertiary interbasaltic formation show distinctive fields. The Skye and Mull boles, Ischigualasto palaeosols and Mumbai modern soils plot close together. Thus from the fossil interbasaltic soil geochemistry it is evident that the palaeoweathering characteristics are different in different flood basalt provinces and the different chemical weathering characteristics should be correlated with the time gap (quiescence periods) between the successive lava flow eruptions and the palaeolatitudinal positions influencing the palaeoclimates.

Age evolution of Gold concentrations in metamorphic rocks

A.M. SAZONOV[1] AND E A. ZVIAGUINA[2]

[1]Siberian Federal University, Krasnoyarsk, Russia (sazonov_am@mail.ru)
[2]Siberian Federal University, Krasnoyarsk, Russia (elena_zv@mail.ru)

The results of examination of gold-bearing rocks in Achaean, Proterozoic and Oligocene metamorphic complexes are presented below. The territories under study are located within the blocks of the basement and the folded frame of old platforms (the Siberian platform, the East–European platform) and the Oligocene folded structure of the Eastern Pamir (Central Asia). The distribution of gold in metamorphic rocks depends on the next regularities.

The oldest super-crustal metamorphic rocks of the granulite facies are characterized with higher concentrations of gold in comparison with clark (12.18 – 55.3 ppb). Charnokites formation, granitization, migmatization and diaphthorezis in the granulite series lead to gold carrying out – 20-55 ton / km^3. These series could be one of the sources of metal for Proterozoic and Phanerozoic mineral deposits.

Gold concentration in the Proterozoic and Phanerozoic metamorphic complexes is 2-5 times more than concentration in the surrounding aleuropelite sedimentary rocks. Gold is introduced with deep fluids into the metamorphism area.

Rocks of the amphibolite facies of zoning metamorphic belts are characterized with the lowest concentration of gold (2.92-4.5 ppb). Double exceeding of gold grades is typical for the greenschist facies (4.25-6.19 ppb) and epidote-amphibolite facies (4.4-6.7 ppb) in comparison with the amphibolite facies. Accumulation of gold takes place under marginal P-T conditions of metamorphism, in the rocks near the boundaries between facies or subfacies (8.21-24.00 ppb).

The distribution of gold in the zoning metamorphic Oligocene rocks of the S-E Pamir is similar to Proterozoic rocks, but gold grades in these units are more than 20% higher in comparison with Proterozoic series.