

Abstract

The Mokrsko gold deposit is characterised by high arsenic concentrations in regolith. Naturally contaminated regolith and stream sediment samples have been studied in order to determine microbially mediated processes that lead to As mobilization. Arsenic concentration in regolith and sediment were 905 mg kg^{-1} and 1749 mg kg^{-1} , respectively. The mineralogy of arsenic in the regolith is dominated by arsenic-bearing goethite and minor arseniosiderite and Ba-pharmacosiderite. In contrast, highly reducing sediments are mainly characterised by secondary realgar and less arsenic-bearing goethite and secondary arsenates. These samples were used for incubation experiments under both aerobic and anaerobic conditions. When glucose was supplied as a C source under anaerobic conditions, indigenous bacteria significantly enhanced the extent of As release from the solid samples into solution. Highly positive correlation between the extracted amount of As and Fe implied that the microbial dissolution of Fe(III)-oxides is responsible for the As release, with possible contribution of secondary arsenates dissolution. On the other side, small amount of arsenic was released from the sediment during the aerobic incubation through the microbially mediated oxidation of secondary realgar. In attempt to find some bacterial species responsible for the As(V) reduction, cultivation and identification of As(V)-tolerant bacteria species were carried out with one positive result. *Pseudomonas putida* was found in the sediment sample. The results of the study indicated a direct microbial arsenic-mobilizing activity in the regolith and stream sediment that may contribute to high dissolved arsenic concentrations in natural waters at the Mokrsko gold deposit.