Sediment geochemistry and mineralogy of arsenic affected areas of West Bengal, India

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The problem of arsenic (As) poisoning in the upper deltaic plain of the Ganga-Bhagirathi river system in the Bengal Basin of West Bengal, India is an alarming issue [1].The incidence of elevated As (>0.05mg/l) in tube well water was observed within a depth range of 10-30m in the older terraces of the Ganga-Bhagirathi river system of the Murshidabad and the Malda districts [3,4]. Both surface and cored (2m-20m) sediment samples (from 46 locations) from banks of the river Ganges and along a transect of the main distributary Bhagirathi-Hooghly river have been analysed exploring the possibility of heavy, clay minerals and reworked silicates concentrating As on their surfaces. The major minerals that dominate both aquifer and river bed sediments are phyllosilicates, apatite, prismatic Fe-Mg rich minerals, and magnetite, apart from expected quartz and orthoclase. Analyses revealed an average As concentration range of 15-25 ppm, mostly on the phyllosilicates (median [As]: 18 ppm), apatite (median [As]: 25 ppm) and magnetite (median [As]: 15 ppm). Dissolved As concentrations of pore water samples from our sediment sampling locations range from <1ppb to >180 ppb (median value of 46 ppb). When alkaline conditions prevail, As can be released from organic fractions in sediments even if dissolution of Fe is low [2,5]. Subsequent studies are undergoing to determine vertical extensibility of As enrichment zones by obtaining surface (<10m) and cored (40-50m) sediment samples along a Ganges-Bhagirathi transect. Prior work has been done to estimate the extent of As contamination in the groundwater using artificial neural network(ANN) based on multi-layer perceptron (MLP) architecture which possibly shows that a four-layer feed-forward back propagation ANN model could be used as an acceptable prediction model for estimating As contamination in groundwater [4].

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Sr-Nd isotopic ratios of Wakurayama dacite as adakite from the Matsue city, inner zone of Southwest Japan Arc

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Introduction

Sr-Nd isotopic ratios of Wakurayama dacite as adakite, Matsue city, Southwest Japan have been examined. The activity of Wakurayama dacite is about 5 Ma ago [1, 2]. We made cleare that this dacite is adakite [3]. In this study, petrological details of Wakurayama dacite became clear. We classified this dacite by the color of the surface of the rock and texture under the microscope. And Sr-Nd ratios and bulk chemical compositions of rocks were determined.

Results and discussion

Wakurayama dacite is basically divided into three groups which are Gray, Olive and Red groups by their color. Those groups can be also distinguished compared with the amount of the minerals, with bulk rock chemical compositions and with Sr-Nd isotopic ratios. These groups having flowed in order of Gray group, Olive group and Red group became clear by their stratigraphy. In addition, the important geochemical feature is that tholeiitic rock series and calc-alkaline rock series are coexistent in one volcano. That is Gray group (FeO*/MgO ratio: 2.55 in average), Olive group (FeO*/MgO ratio: 6.42 in average) and Red group (FeO*/MgO ratio: 2.51 in average) are tholeiite, calk-alkaline and tholeiitic rock series respectively. And almost all rocks of Wakurayama dacite as adakite show high in Al (18.96 wt% in average), low in Mg (1.36 wt% in average), high in Sr (636 ppm in average) and low in Y (10 ppm in average). Above chemical features of wakurayama dacite is very similar with adakites [4]. That is Wakurayama dacite magma may derived from the subducted materials like oceanic sediment.

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