

Signatures of ESR signals observed in quartz of Kizu river sediments and in host rocks

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Paramagnetic lattice defects in quartz have recently been used as tracers to study the transportation of sediments on the surface of the earth especially for the origin of aeolian dust (e.g. Toyoda and Naruse, 2002), as isotopes have been used. Studies on aeolian dust have used only the E₁' center while impurity centers were shown to be other useful signatures in the studies of river sediments (Shimada, 2008). The present research aims to characterize the sediments of Muro River, a branch river of Kizu River, by analyzing the ESR signals quartz of the sediments. We collected seventeen river sediments and two granites which are possible sources of river sediments. The samples were crushed and sieved to 1000-500, 500-250, and 250-75 micrometers. Quartz grains were extracted from each size fraction by chemical treatment and density separation. The quartz grains were heated at 400 degree celsius for 1 h to erase the inherited ESR signals before gamma ray irradiation. ESR measurements were performed at room temperature and at 81 K to observe E₁' and Ge, and Al and Ti centers, respectively.

The impurity centers were enhanced by gamma ray irradiation. The formation efficiencies of the signals at the origin were obtained, which probably correspond to impurity concentrations in quartz. The E₁' center was observed after heating the sample irradiated to 2.5kGy at 300 degree celsius for 15 min. The formation efficiencies of impurity centers and the intensity of the E₁' center showed constant values in 10 samples of sediments of Muro river with standard deviations of (7 to 12%). It was also found that these values characterize the sediments of each branch river. Details will be reported in the presentation.

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