Meteoric ^{10}Be in bed-sediments of rivers flowing to Lake Biwa, central Japan

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The radioactive cosmogenic Beryllium-10 (^{10}Be) is produced by spallation reaction between high-energy neutron and target nuclei mostly in the atmosphere (meteoric ^{10}Be) and slightly within mineral lattices in material at the Earth's surface (*in situ* ^{10}Be). The meteoric ^{10}Be is a powerful tool for determining soil residence times and surface erosion rate. Recently, it is reported that the Earth surface denudation rate and its weathering intensity can be calculated using the isotopic ratio of meteoric ^{10}Be to mineral-derived stable ^{9}Be in river sediments (von Blanckenburg *et al*., 2012). The purpose of this study is to examine this approach to smaller rivers in Japan. We tested eight bed-sediments (<180 μm) of rivers flowing to Lake Biwa, Shiga Prefecture, central Japan. The ^{10}Be measurements were carried out with 5MV AMS at the TONO Geoscience Center, JAEA, Japan.

The ^{10}Be concentrations of the bed-sediments were 1.9–8.6×10^{7} atoms g^{-1}, except for the Ado river sediment. The Ado sediment, which showed high ^{10}Be of 17.1×10^{7} atoms g^{-1}, consists mainly of fine fraction <32 μm (92%), and contains little primary minerals such as feldspar, different from the other bed-sediments. Therefore, the high ^{10}Be of the Ado sediment could be due to the grain size effect.

The denudation rates of the bed-sediments calculated from the ^{10}Be/^{9}Be ranged from 50 to 1179 t km^{-2} yr^{-1}. The rates were low in the rivers flowing through plane areas at the southern to eastern parts of Lake Biwa, while high in rivers flowing down mountain areas at the northern to western parts. This trend coincides with the denudation rate calculated from the standard deviation of altitude per unit area (Fujiwara, 1999). The recipitation rates around each river basin showed a positive correalation (R^2=0.985) with the denudation rate estimated from ^{10}Be/^{9}Be of the bed-sediments except for the Ado sediment. The results indicate that ^{10}Be concentration in river bed-sediments can be used as an indicator of precipitation and surface erosion of the catchment area.