Geophysical Research Abstracts, Vol. 9, 00861, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-00861

High riverine fluxes of dissolved silica from Japan – the influence of lithology

J. Hartmann (1), **N. Jansen** (1), H.H. Dürr (2), S. Kempe (1)

(1) Institute for Applied Geosciences, Darmstadt University of Technology, Germany,
(2) Department of Physical Geography, Utrecht University, Netherlands
(jansen@geo.tu-darmstadt.de / Phone: +49 6151 166841)

Silicate weathering is a significant sink for atmospheric CO_2 and thus relevant for climatic processes. Weathering rates are controlled by climate, vegetation, land use, relief and particularly lithology. It was hypothesized that volcanic islands and back arc basins are hyperactive with respect to silicate weathering. This is due to the high content of easily weatherable Ca + Mg-silicate minerals abundant in volcanic rocks. This work analyzes the influence of lithology on specific silica fluxes. Data from 262 river chemistry monitoring locations were used as well as a newly developed lithological map. It distinguishes 15 lithologic units. According to this classification the lithology of Japan is assembled of 13% plutonic rocks, 32% volcanic rocks, 49% sediments and 5% metamorphites, contrasting with the world average lithology that consists of 7% plutonic rocks, 7% volcanic rocks, 64% sediments and 16% metamorphites. 65% of the surface area of Japan are documented by the data set and the average silica flux for this area is 22 $t \cdot km^{-2} \cdot a^{-1}$. This value is 6.7 times higher than the world average of 3.3 $t \cdot km^{-2} \cdot a^{-1}$(Dürr et al., in prep.). Despite its small size, Japan discharges 2.1% of worldwide riverine dissolved silica fluxes into coastal waters. The specific silica flux of the most productive watershed is as much as 84 $t \cdot km^{-2} \cdot a^{-1}$. The watersheds containing more than 80% volcanic rocks are characterized by an average specific silica flux of 40 $t \cdot km^{-2} \cdot a^{-1}$. This stretches out the importance of volcanic rocks for weathering rates and CO_2 uptake respectively.

Reference:

Dürr, H., Meybeck, M., Sferratore, A. & Hartmann, J. (in preperation): Estimating silica fluxes to the coastal zone using a global segmentation, for C.R. Geosciences