Geophysical Research Abstracts, Vol. 9, 05943, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-05943

A new method to analyze petrologic texture and its application to estimate weathering style of granitoid

H. Tobe (1), M. Chigira (1)

(1) Disaster Prevention Research Institute, Kyoto University, Japan
(htobe@slope.dpri.kyoto-u.ac.jp / Fax: +81 774-384105 / Phone: +81 774-384099)

Petrologic textures have important information not only for the origin of rocks but also for the style of weathering, which provides a material to slide by rainstorms. Furthermore, petrologic textures might determine the structure of a weathering profile, consequently landslide scheme and intensity. Notwithstanding this importance of petrologic texture, it has been studied only qualitatively and not quantitatively. To evaluate the regional susceptibility to landslide, petrologic textures must be quantified and linked to weathering profiles and landslide mechanisms.

We developed a new method to analyze petrologic textures, particularly the connectivity of mineral grains, by means of image analysis. We made an algorithm to determine whether a certain mineral grains are connected from the top of a view window to the bottom and used it for the analysis. We divide a rock surface to smaller view windows and count the number of windows with the full grain connection from the top to the bottom, and named the rate of full connection view numbers to the whole view numbers as *"Rct (rate of connection)"*. Minerals with high connectivity have large *Rct*. The *Rct* spectrum as a function of view size is defined as connectivity curves.

We applied this method to measure the connectivity of rock-forming minerals in granite and granodiorite taken from Obara village, central Japan, where 1972 rainstorm induced many landslides in granite areas but not in granodiorite areas. The results showed that plagioclase has higher *Rct* for all view sizes in granodiorite than in granite. Even though granodiorite is more abundant in plagioclase than granite, the *Rct* is not directly dependent on mineral modes but on connectivity. Plagioclase easily weathered to clays like halloysite and kaolinite, which would bind weathering resistant minerals, such as quartz and potassium feldspar, if the original plagioclase grains

were well connected. Therefore, weathered granodiorite is not easily loosened to form a surface layer to slide near the slope surfaces but weathered granite is. This difference in binding effect was a major reason why few landslides occurred in weathered granodiorite areas in comparison with many landslides in granite areas.