

広島大学学術情報リポジトリ
Hiroshima University Institutional Repository

Title	Study on the Weathering of Granite in Hiroshima Prefecture, Japan
Author(s)	MIYAHARA, Kenji
Citation	Journal of science of the Hiroshima University. Series C, Geology and mineralogy , 7 (4) : 297 - 299
Issue Date	1977-05-25
DOI	
Self DOI	10.15027/53064
URL	https://ir.lib.hiroshima-u.ac.jp/00053064
Right	
Relation	



Study on the Weathering of Granite in Hiroshima Prefecture, Japan*

By

Kenji MIYAHARA

with 1 Table

The problem in question has hitherto been dealt with mainly in pursuit of the technical methods for development of the natural environments or for prevention of the disasters. It thus results in that the previous data so far obtained were, if in the case of geological works, merely qualitative in character and those given for the industrial procedures were, though accurately along the JIS rule, combined simply in the soil mechanics almost without any considerations on the mineralogical constituents contained.

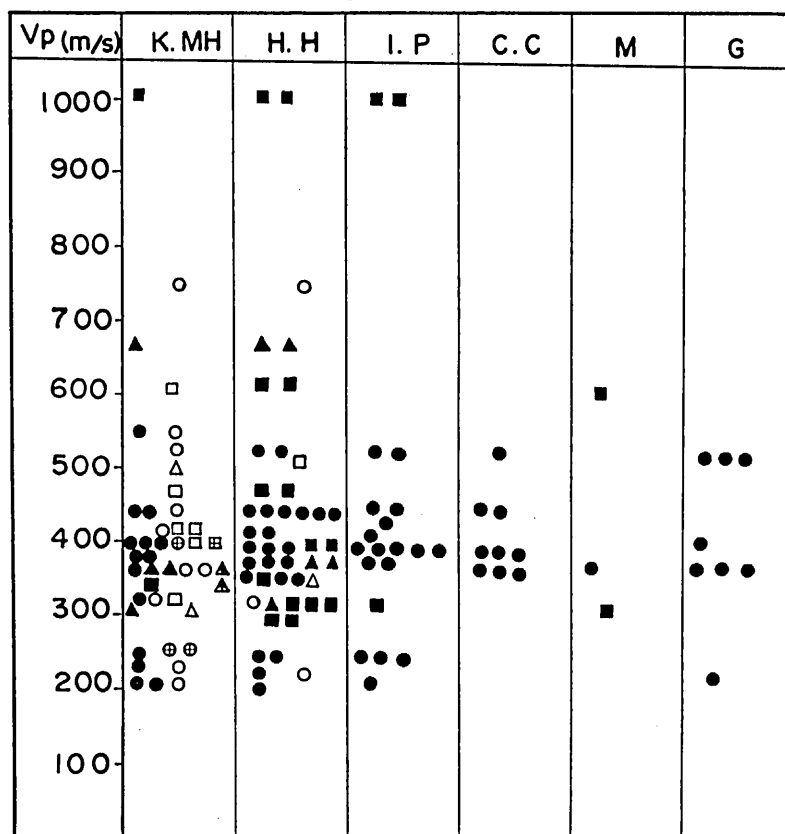
The present work has been carried out for the purpose of making up for the blind sides in these kinds of researches concerning the "Masa", the product derived from weathering of the original granites distributed widely along the Seto Inland Sea and bearing variety in grain-size: i. e. the coarse-grained from Ōno and Kirikushi, the medium-grained from A and B points in Saijō and the fine-grained from Hachihonmatsu. In field, the specimens were collected with special cares on the hydrothermal vein or otherlikes including the systems of joints and faults in order to avoid confusion with the pure effects of weathering and the density together with the velocity of elastic waves (V_p and V_s) revealed in the zones of weathering were subjected to quantitative measurement on the spot concerned. In laboratory, the tests related to the real density, water content, and void ratio, etc., the grain-size analysis and inspection through X-ray diffraction were put into operation and the specimens passing through the respective sieves with each diameter were mineralogically determined in comparison with the data obtained for the original rocks in relation to their grain-size and to their mineralogical compositions specifically for clarifying the characteristic conversion into the facies of finer size with progression of weathering in grade.

The results obtained are considered remarkably suggestive and summarized as follows:

The different tendencies are surely recognized regarding the concentrated parts of grain-size on the frequency curves given for each specimen and their relation to the grade of weathering shown by the velocity of the elastic waves propagating through the zones or the specimens concerned are also worthy of mention. At the same time it seems noticeable to a certain extent that the plagioclase are more easily proved to be finer in grain-size than in the case of the coarse-grained potash-feldspars and crumbling of the forms into finer size in association with their kaolinization become more and more distinguishable with increase of the void ratio. As regards the relation of the mineralogical composition to easiness of kaolinization, distinctive features in distribution

* Abstract of doctoral thesis (Science) presented to the Hiroshima University in 1973

is found concentrated within the area of 10~30% in anorthite molecule (determined through X-ray analysis), although the specimens from Hachihonmatsu and B point in Saijō are hardly identified because of their severe alteration. The fact is that An-component of the plagioclase contained in the original rocks reveals respectively such values as 19% in the specimen from Ōno, as 22% in those from Kirikushi and as 28~30% in those from Saijō, pointing to a trend of easier alteration with higher content of Ca in the composition of plagioclase. It is to be noted that X-ray diffraction patterns of kaolinite derived from alteration of the plagioclase are rich in variety and peculiar occurrences of the specimens with $I_{(001)} \ll I_{(020)}$ are discriminatively discernible in the case of

 TABLE 1. RELATION OF V_p TO THE CLAY MINERALS CONTAINED.


circles: coarse-grained granite, triangles: mediun-grained granite,
squares: fine-grained granite.

open marks: obtained from altered plagioclase, solid marks: obtained from the samples.

K: kaolinite, MH: metahalloysite, H.H: hydrated halloysite IP: intermediate phase,

CC: clay chlorite,

M: montmorillonite, G: gibbsite.

those with less than 50m/s in V_p . The table 1 given for the relation of V_p to the species and assemblage of the clay minerals included in the zones of weathering clearly indicates

Study on the Weathering of Granite in Hiroshima Prefecture, Japan

that various types of alteration of plagioclase and biotite begins in the condition of $V_p > 1000\text{m/s}$ and the amount of the clay minerals in the weathered granite rapidly increase in the condition of $V_p < 500\text{m/s}$. Remarkable is that the intermediate phases appear between the fully hydrated halloysite and less hydrated metakaolinite and are convertible completely into the latter of the two below 100°C in association with less of water at 60°C .

Furthermore, such an intimate connection of V_p with the void ratio as is characterized with the flexure appearing near 0.5 in e value as well as with the marked increase of the former within the range of less than 0.5 is evidently correlative with its relation to the mineral assemblage and the similar trend is also recognized in the relation between the Poisson's ratio and the Void ratio. These results may disclose that lithologic differences of the original rocks are reflected on the different behaviors in elastic deformation of their weathered parts within the definite range of $0.4 \sim 0.5$ in e value.

Kenji MIYAHARA: GEOLOGICAL SECTION OF FUKKEN CHOSA
SEKKEI Co. LTD, 2-11-31, HIKARIMACHI,
HIROSHIMA, 730, JAPAN