GEOLOGIC RELATION BETWEEN HYDROTHERMALLY ALTERED VOLCANIC ROCKS AND GRANITIC ROCKS IN NOMA PENINSULA, KAGOSHIMA PREFECTURE

Rep. Fac. Sci., Kagoshima Univ. (Earth Sci., Biol.),
No. 13, pp. 29–33, 1980.

GEOLOGIC RELATION BETWEEN HYDROTHERMALLY ALTERED VOLCANIC ROCKS AND GRANITIC ROCKS IN NOMA PENINSULA, KAGOSHIMA PREFECTURE

By

Masahiko YAMAMOTO*, Katsutoshi TOMITA*, and Noboru ŌBA*

(Received Aug. 30, 1980)

Abstract

The Satsuma Peninsula granitic rocks of middle Miocene age intrude the Older Volcanics, correlated with so-called "Green Tuff", in Noma Peninsula of Kagoshima Prefecture. This fact indicates that the Miocene volcanism took place in the south region as well as in the north region of Kagoshima Prefecture.

Introduction

Hydrothermally altered volcanic rocks composed of propylite and associated "green tuff" are sparsely distributed in South Kyushu, and constitute country rocks of hydrothermal vein-type deposits in some mining districts. The geologic relation between granitic intrusives, which sporadically occur in South Kyushu, of 12–16 m.y. before present in age determined by the K-Ar method (NOZAWA, 1968; SHIBATA, 1978) and the volcanic rocks has not been settled. In this paper, the field relation between the volcanic rocks and the granitic intrusives in Noma Peninsula, Kagoshima Prefecture, and its geological meaning will be discussed.

Field Relations

The surveyed area is located in the southern coast of Noma Peninsula, and geology of Noma Peninsula has been studied by YAMAMOTO *et al.* (1969). The Shimanto Group, the Older Volcanics, the Satsuma Peninsula granitic rocks and the Younger Volcanics in ascending order are the main geologic constituents. Geologic map of the surveyed area is shown in Fig. 1, and geologic succession is listed in Table 1.

The Shimanto Group, distributed in the western part of the surveyed area, consists of alternation of sandstone and shale, and strikes N70°E and dips 60°N in general.

The Older Volcanics, which occur along the seacoast of the area, consist of hydrothermally altered andesite, agglomerate and tuff breccia. The rocks of the Shimanto Group are unconformably overlain by them.

* Institute of Earth Sciences, Faculty of Science, Kagoshima University, Kagoshima 890, Japan.

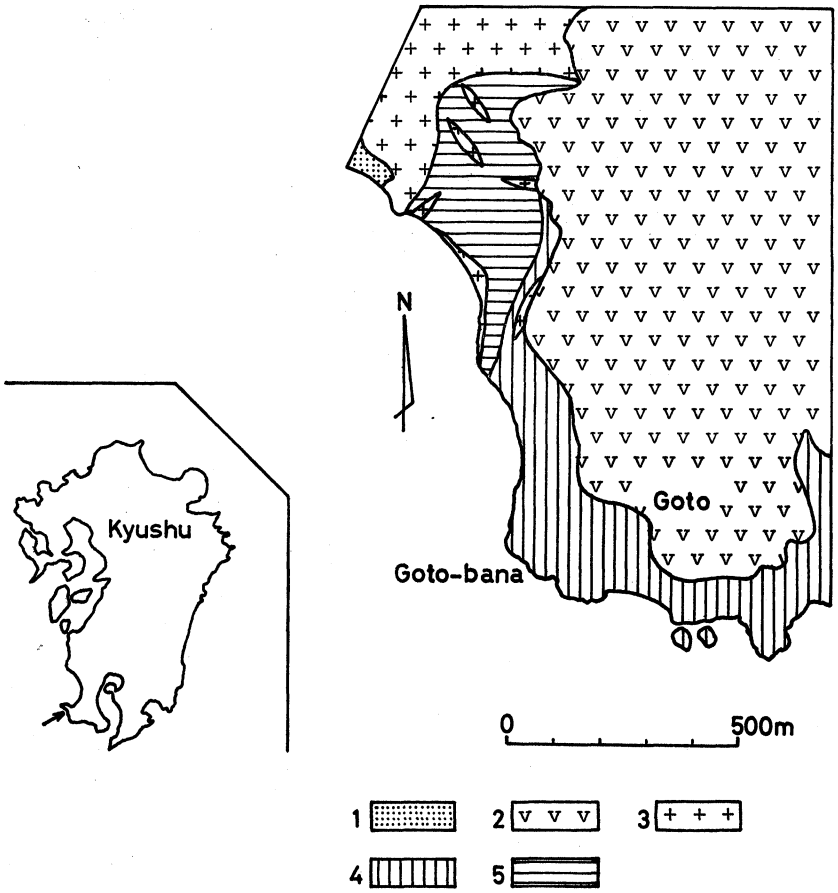

Fig. 1. Index and geologic maps of the southern coast of Noma Peninsula, Kagoshima Prefecture. Stratigraphic sequence: 1, Alluvial deposits; 2, Younger Volcanics; 3, Satsuma Peninsula granitic rocks; 4, Older Volcanics; 5, Shimanto Group.

Table 1. Geologic succession of the southern coast of Noma Peninsula, Kagoshima Prefecture

Recent	Alluvial deposits
Pleistocene-Pliocene(?)	Younger Volcanics
Miocene	Satsuma Peninsula granitic rocks
	Older Volcanics (propylite)
Mesozoic	Shimanto Group

The Satsuma Peninsula granitic rocks occur in the western part of the area, and intrude both the Shimanto Group and the Older Volcanics (Fig. 2). The rocks are mainly composed of granite porphry and liparite. Mafic minerals of the rocks are chloritized (YAMAMOTO *et al.*, 1969; YAMAMOTO *et al.*, 1970).

The Younger Volcanics, distributed in the highlands of the area, are largely composed of tuff breccia accompanied by andesitic lava, agglomerate, conglomerate,

Fig. 2. Photograph showing the contact of the Satsuma Peninsula granitic rocks (righthand side of the hammer) and the Older Volcanics (lefthand).

tuffaceous sandstone and siltstone, and are hydrothermally altered in part. The rocks of the Shimanto Group, the Older Volcanics and the Satsuma Peninsula intrusives are unconformably overlain by those of the Younger Volcanics.

Discussion

The presence of propylite and "green tuff" in the southwestern part of Kagoshima Prefecture has been estimated by MIYAHISA and MATSUMOTO (1969). It was made clear newly in the process of this study that the Older Volcanics composed mainly of propylite are intruded by the Satsuma Peninsula granitic rocks of middle Miocene age, determined by the K-Ar method to be 12 m.y. before present (SHIBATA and NOZAWA, 1968). This fact is in good accordance with the following geologic evidences of propylite and "green tuff" in the north region of Kagoshima Prefecture: (1) Molluscan fossils (*e.g., Patinopecten kimurai*) of Miocene age was collected from the "green tuff" of Kushikino Mine (FUKUYAMA, 1954); (2) Fission track dating for the Yamano Rhyolite which lies on propylite in Okuchi district indicates middle Miocene (13–14.7 m.y.) in age (MATSUMOTO *et al.*, 1977; MIYAHISA *et al.*, 1978); and (3) Semiquantitative fission track dating for the Hokusatsu Older andesitic rocks which are hydrothermally altered indicates Miocene in age (MIYAHISA *et al.*, 1978).

These geologic evidences suggest that the Older Volcanics in the surveyed area can be correlated with propylite and associated "green tuff" in the north region of Kagoshima Prefecture, and that the Miocene volcanic activity did not take place only in the north region but also in the south region of Kagoshima Prefecture. It is also considered that both propylite and "green tuff" in South Kyushu can be correlated with those of the Nishikurosawa Stage or the Daijima Stage in the Green Tuff province of Northeast Japan.

The Nansatsu Group (KAWANO *et al.*, 1969), probably, of Pliocene to Pleistocene in age is developed in Makurazaki district southeast of Noma Peninsula, and constitutes country rocks of hydrothermal vein-type deposits in Kasuga, Iwato and Akeshi Mines. The rocks of the lower member of the Nansatsu Group are mainly composed of

hydrothermally altered andesite, and those of the upper member of the Group are mainly composed of "green tuff" and tuff breccia. The Older Volcanics in the surveyed area is lithologically similar to the rocks of the lower member of the Nansatsu Group. Judging from the fact that granitic pebbles were discovered from the basal conglomerate of the lower member, however, it is suggested that the formation of the Older Volcanics was made before the Nansatsu Group. On the other hand, it is considered that the Younger Volcanics can lithologically be correlated with the rocks of the upper member of the Nansatsu Group.

Thus, it can be said that both the Older Volcanics and the Younger Volcanics were subjected to hydrothermal alteration. Therefore, it is considered that chloritization seen in mafic minerals of the Satsuma Peninsula granitic rocks, reported by YAMAMOTO *et al.* (1969) and YAMAMOTO *et al.* (1970), is closely related to the hydrothermal alteration. The facts that the Satsuma Peninsula granitic rocks are composed of granite porphyry and liparite and that the formation of the Satsuma Peninsula granitic rocks is chronologically contemporaneous with that of the Yamano Rhyolite suggest that there was volcano-plutonism in the granitic intrusives of 12–16 m.y. in age in South Kyushu as well as Tertiary granitic rocks in the Green Tuff province reported by ORIMOTO (1965).

Acknowledgements

We are grateful to Prof. S. HAYASAKA and Mr. K. ÔKI, Kagoshima University, for their valuable comments. Mr. F. ALMEIDA, Kagoshima University, read the manuscript.

References

FUKUYAMA, K. (1954), Geology and ore deposits of the Arakawa mine, Kagoshima Prefecture. *Kumamoto J. Sci., Ser. B, Sec. 1, Geol.*, **4**, 19–89.

KAWANO, Y. and others (1969), Reprot of elementary geology of gold mine (Nansatsu district). Kinzokukoubutsu-tankosokushinjigyodan, 18p., (in Japanese).

MATSUMOTO, Y., NISHIMURA, S., and TAJIMA, T. (1977), Fission track ages of some igneous rocks in Kyushu. *Bull. Fac. Liberal Art., Nagasaki Univ., Natural Sci.*, **17**, 63–75, (in Japanese with English abstract).

MIYAHISA, M. and MATSUMOTO, Y. (1969), Some problems on propylites and green tuffs in Kyushu. In: Some Problems on Green Tuffs, 249–256, (in Japanese).

——— and others (1978), Report of elementary geology and ore deposits of gold mine (Hokusatsu district). Shigenenergy-cho, 28p., (in Japanese).

NOZAWA, T. (1968), Radiometric ages of granitic rocks in Outer Zone of Southwest Japan and its extension; 1968 summary and north-shift hypothesis of igneous activity. *J. Geol. Soc. Japan*, **74**, 485–489, (in Japanese with English abstract).

ORIMOTO, S. (1965), Some characteristics of "Tertiary Granites" in northeastern Japan. *J. Japan. Assoc. Min. Pet. Econ. Geol.*, **53**, 55–66, (in Japanese with English abstract).

SHIBATA, K. (1978), Contemporaneity of Tertiary granites in the Outer zone of Southwest Japan. *Bull. Geol. Surv. Japan*, **29**, 551–554, (in Japanese with English abstract).

——— and NOZAWA, T. (1968), K-Ar ages of acidic rocks of Nomamisaki and Hioki mountains, Kyushu, Japan. *Ibid.*, **19**, 21–24.

YAMAMOTO, H., YAMAMOTO, M., and ŌBA, N. (1970), On the Satsuma Peninsula granitic rocks,

Kagoshima Prefecture, Japan. *J. Japan. Assoc. Min. Pet. Econ. Geol.*, **64**, 95–103, (in Japanese with English abstract).

YAMAMOTO, M., YAMAMOTO, H., KAMINAKA, H., and ŌBA, N. (1969), Geology of Noma Peninsula and Kaseda-Marurazaki district, southwestern part of Satsuma Peninsula, Kagoshima Prefecture, Japan. *Rep. Fac. Sci., Kagoshima Univ.* (*Earth Sci., Biol.*), **2**, 15–25, (in Japanese with English abstract).

Noma Peninsula 野間半島
Kushikino 串木野
Okuchi 大口
Makurazaki 枕崎
Kasuga 春日
Iwato 岩戸
Akeshi 赤石
Goto 後藤
Goto-bana 後藤鼻

Satsuma Peninsula granitic rocks 薩摩半島花崗岩質岩類
Yamano Rhyolite 山野流紋岩
Hokusatsu Older andesitic rocks 北薩古期安山岩類