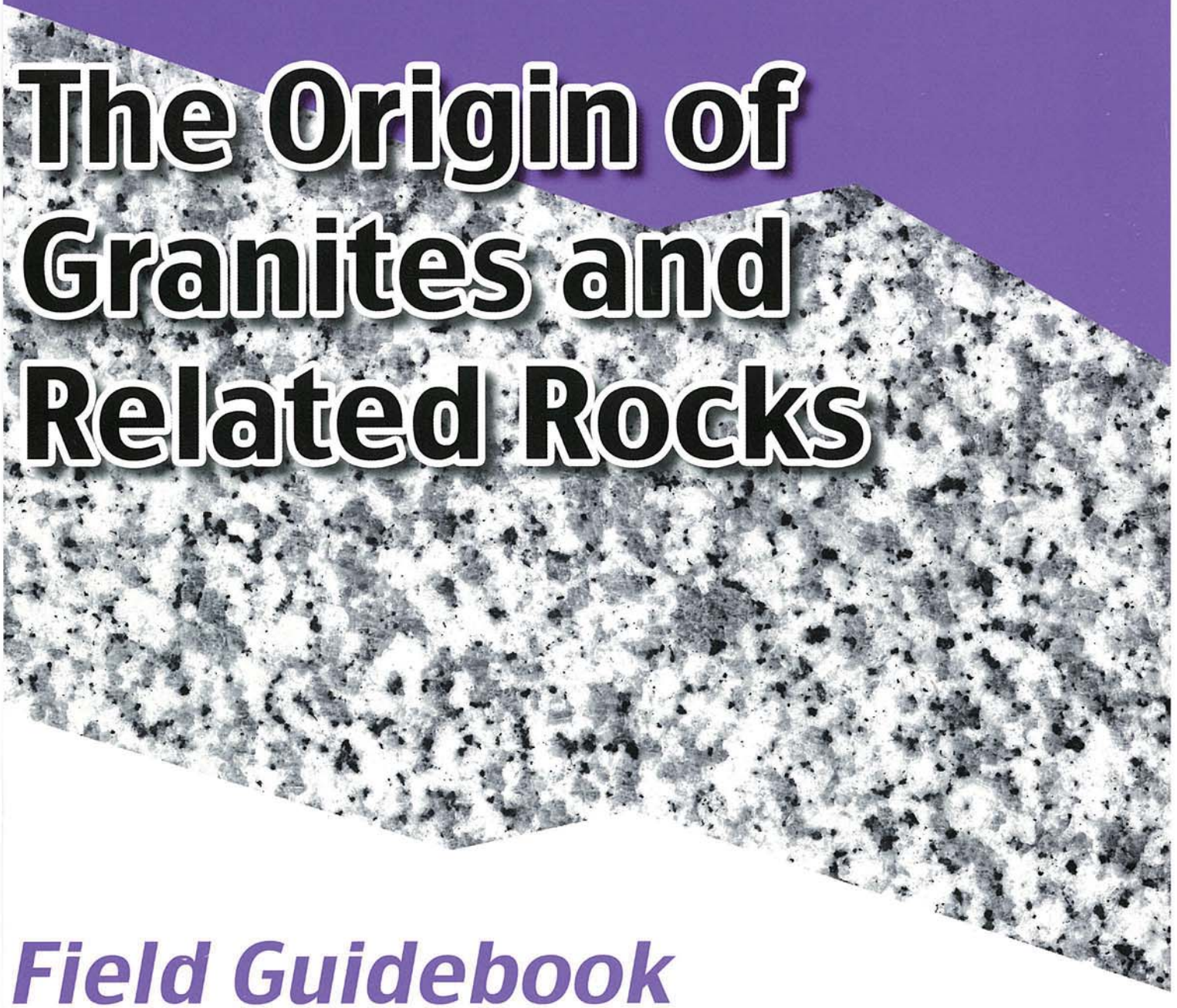
Hutton Symposium V

The Origin of Granites and Related Rocks



Field Guidebook

Geological Survey of Japan, Interim-Report 28, 2003

National Institute of Advanced Industrial Science and Technology

Cover. The most typical granite in Japan, which contains biotite but no magnetite (ilemenite series) and late Cretaceous in age, widespread in the largest batholith of the Inner Zone of Southwest Japan. The specimen was taken from quarry at Inada of the Tsukuba Mountain region. (Shunso ISHIHARA)

Cover design by Yukio KAWAMURA, GSJ.

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Japan 2003

Field Guidebook

Edited by Toshiaki SHIMURA and Shunso ISHIHARA

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The Origin of Granites and Related Rocks
Field Guidebook

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Trip A1 Quaternary and Pliocene granites in the Northern Japan Alps

S. HARAYAMA, H. WADA, and Y. YAMAGUCHI

Photo. A1-1
Mountain view from Mt. Kashimayarigatake which is the highest exposed portion (2890 m) of the Kurobegawa Granitic Pluton.

Photo. A1-2
Mafic microgranular enclave (MME) dense zone in the upper part of the Kurobegawa Granitic Pluton. Generally, elliptic MMEs with major axes of 0.1 to 2 m densely occur in the large part of the pluton.

Photo. A1-3
MME mingled with felsic mush consisting mainly of plagioclase and quarts phenocrysts.

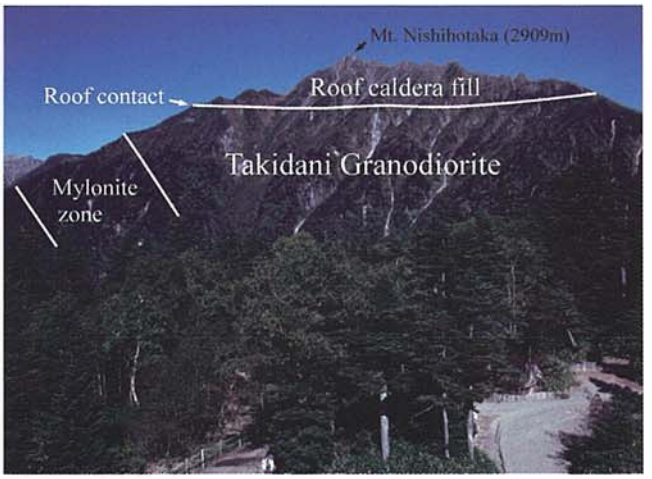

Photo. A1-4
Roof contact between the caldera fill volcanics (1.76 Ma) and the Takidani Granodiorite: Mylonite zone is widely observed in the Takidani Granodiorite.

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Trip A2 Mid-Cretaceous plutono-metamorphic complex of the Ryoke and San-yo zones in the Iwakuni-Yanai district, SW Japan

T. Okudaira, M. Yuhara, T. Ikeda, T. Nakajima

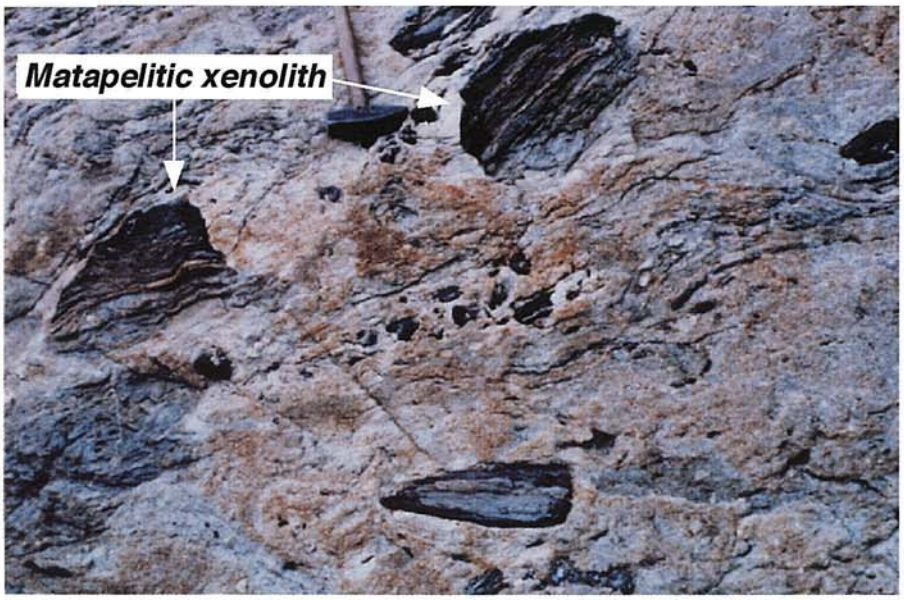

Photo. A2-1
Agmatitic migmatite (Nagano-Tengatake migmatite) in the K-feldspar-cordierite zone at Tengatake. The granitic rock includes numerous metapelitic xenoliths which are partially metasomatized.

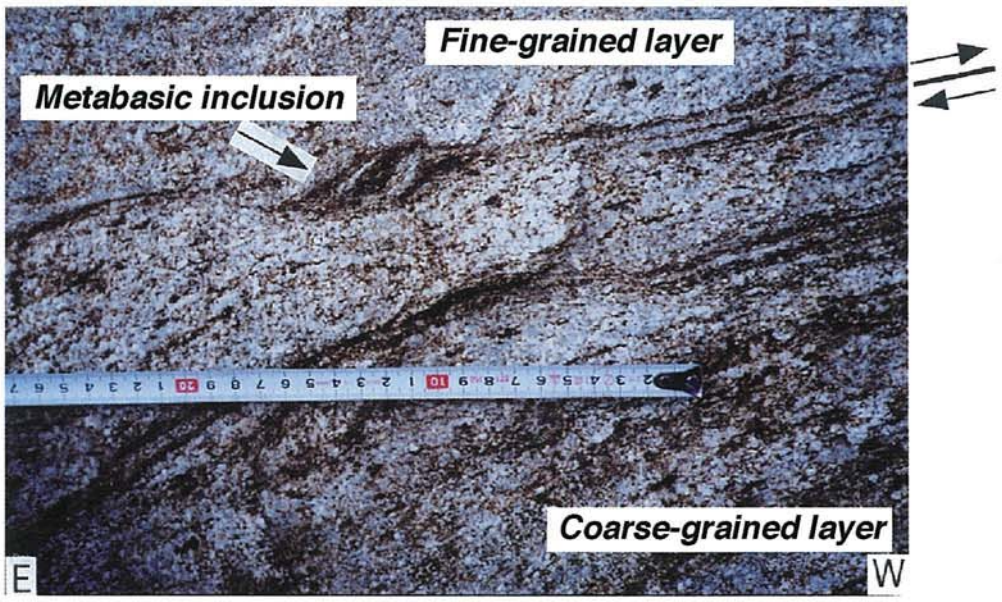

Photo. A2-2
High-temperature shear zone of the Gamano granodiorite at the boundary between the garnet-cordierite zone and the sillimanite-K-feldspar zone, Yashiro-jima Island. Many dextral shear zones (fine-grained layer) are observed in the coarse-grained granodiorite. Asymmetric structures of mafic enclaves and dykes are also observed.

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Trip A3 Ilmenite-series pink and gray granitoids and felsic/mafic magma interaction across the late Cretaceous Inner Zone Batholith of SW Japan

S. ISHIHARA, S. YOSHIKURA, H. SATO, Y. SATAKE, S. ATSUTA

Photo. A3-1
Cuspate load cast-like structures developed at the chilled base of gabbro layer resting on diorite layer at Stop-10.

Photo. A3-2
Heterogeneous diorite layer with various types of elongated mafic pillows and leucocratic pipe projecting upward into overlying chilled gabbro at Stop-17.

Photo. A3-3
Composite dike with mafic pillows in a felsic matrix intruding into the gabbro-diorite layered sequence at Stop-19.

Photo. A3-4
Fragmented synplutonic mafic dike intruding into the granite at Stop-14.

Photo. A3-5
Synplutonic mafic dike intruding into the granite at Stop-7.

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Trip A4 Miocene granites and the Hishikari gold deposits in Kyushu

M. YAMAMOTO, Y. KAWANO, A. IMAI, and K. NISHIMURA

Photo. A4-1 (Stop. 1)
Gold-bearing quartz vein (Keisen No.3 vein) at underground mining face, Sanjin deposit of the Hishikari mine.

Photo. A4-2 (Stop. 2)
K-feldspar megacryst-rich granodiorite (Kusubae-type) in the Shibi-san stock. The megacryst shows several centimeters in diameter. The long side of photograph indicates 25 centimeters.

Photo. A4-3 (Stop. 6)
The Koyama-type rock of the Osumi pluton crops out along the Ogushi sea coast. It is characterized by enrichment of garnet. Sedimentary enclaves showing various textures are also found in beach boulders.

Photo. A4-4 (Stop. 11)
Sedimentary enclave-dominant felsic dike in the Heda-Okawa-type rock of the Osumi pluton.

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Trip B1 Crustal section and anatexis of lower crust due to mantle flux in the Hidaka metamorphic belt, Hokkaido, Japan

M. Owada, Y. Osanai, T. Shimura, T. Toyoshima and Y. Katsui

Photo. B1-1
Topographic view of the Hidaka Mountains (the photo taken in the early summer). The Hidaka metamorphic belt is thought to be a crustal section of the Tertiary age, exhuming along the Hidaka Mountains.

Photo. B1-2
Migmatitic mafic granulite in the highest-grade part of the Hidaka metamorphic belt at Nishuomanai River area.
Note that the leucocratic veins derived from anatecitic melt contain completely euhedral orthopyroxene. A partial melting of the mafic granulite probably took place during the early Eocene peak metamorphic event.

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Trip M1 Ryoke granitoids and metamorphic rocks in the eastern Mikawa district,central Japan

T. KUTSUKAKE, A. MIYAKE and Y. OHTOMO

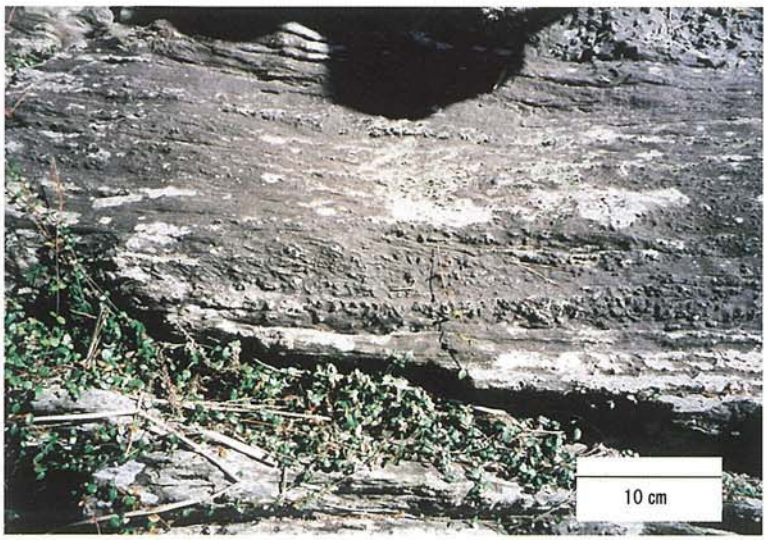

Photo. M1-1
Andalusite-porphyroblasts (embossed on the weathering surface) in the schist of the andalusite zone at Stop 2.

Photo. M1-2
Layering developed in the Mitsuhashi Granite at Stop 5.

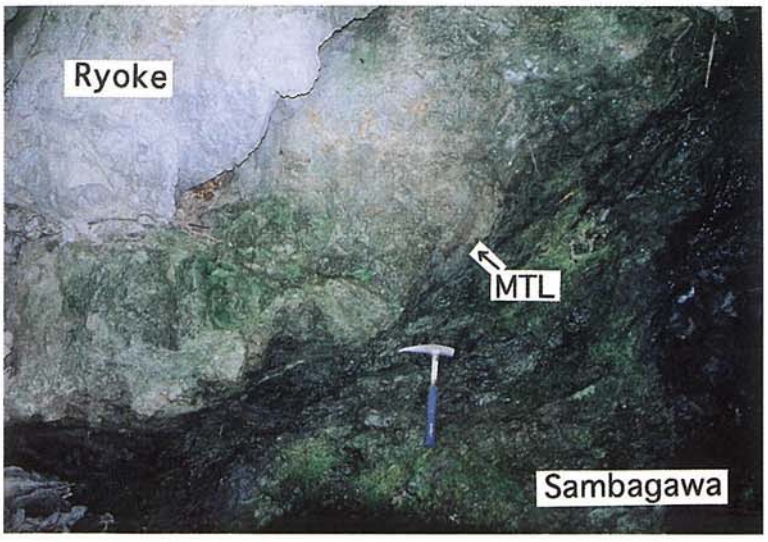

Photo. M1-3
An outcrop of the Median Tectonic Line (MTL), dividing the granitic mylonites of the Ryoke Belt (Ryoke) and the Sambagawa crystalline schists (Sambagawa) at Stop 3.

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Trip M2 Post-tectonic two-mica granite in the Okazaki area, central Japan: a field guide for the 2003 Hutton Symposium

Y. NAKAI and K. SUZUKI

Photo. M2-1
Xenolith of biotite schist in fine-grained biotite granodiorite from Yamasen Quarry (Stop 1). The schist was intruded by coarse-grained biotite granite prior to inclusion in the granodiorite. The thin reaction selvage around the xenolith is fine-grained and rich in biotite.

Photo. M2-2
Boundary between fine and medium-grained biotite granodiorite observed on the fresh surface of an excavated block at Stop 1. Faint laminations (flow banding?) in the lighter colored medium-grained biotite granodiorite lie parallel to the boundary on the left.

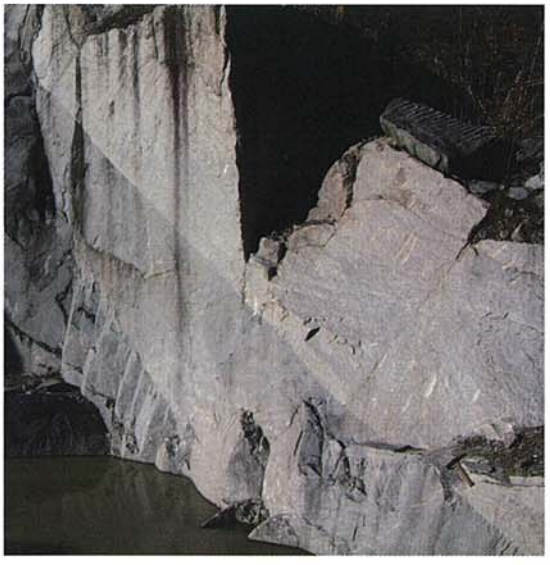

Photo. M2-3
Boundary between fine-grained biotite granodiorite (lower left) and medium-grained two-mica monzogranite at Stop 2 (Tokai Quarry). The boundary is remarkably straight and is much sharper than that between fine- and medium-grained biotite granodiorite at Stop 1. An aplitic veinlet is intruded into fine-grained biotite granodiorite from the boundary below the hammer.

Photo. M2-4
Distinctive laminations, possibly flow-banding, in medium-grained two-mica monzogranite at Stop 4. The banding is defined by differences in grain size rather than mineral content. The grain sizes of quartz and feldspar never exceed 2 mm in dark bands, whereas in light bands grains are up to 4 mm across. Crenulations in the layers suggest movement in a partially solidified magma. The distinctive dark patch beside the hammer is a biotite-rich enclave.

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Trip M3 Koto Rhyolites and their related granitic rocks around Lake Biwa, southwest Japan

Y. SAWADA and S. NAKANO

Photo. M3-1
Panoramic view of the Hira Mountain Range consisting of Jurassic accretionary complex and Late Cretaceous granitoids from the Ohmi-Maiko coast.

Photo. M3-2
Aerial photograph of the Koto Plain east of Lake Biwa. An islet in the lake is Okishima. This islet and several hills in the plain consist of the Koto Rhyolies.

Photo. M3-3
Distant view of Okishima (front) and Hira Mountain Range (back). (Photo by H. Fujimoto)

Photo. M3-4
Okino-shiraishi consisting of the Koto Rhyolite in Lale Biwa. (photo by H. Fujimoto)

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CONTENTS

Editorial Preface

We extend a warm welcome to participants of the field excursions related to the Hutton Symposium V in Japan, which is held for the first time in island arc setting. The Japanese islands are composed of various geologic units formed by severe tectonic and magmatic activities being located between huge continental and oceanic crusts throughout the earth history. Thus, a variety of geologic interest are observed at different sites over the Islands; these are visited from the southern end, Kyushu, to the northern end, Hokkaido, during the pre- and post-Symposium excursions (see map in the next page).

Among the pre-Symposium excursions of Trip A1, you will observe granites with mafic enclaves and also with the youngest age, Quaternary and Pliocene, in the rapidly elevated high mountainous region, called the Northern Japan Alps, of central Japan.

Trips A2 and A3 are both visiting in the Seto Inland Sea region, where the late Cretaceous metamorphic and granitic rocks occur. Trip A2 emphasizes the low *P/T* Ryoke metamorphic rocks, while Trip A3 includes various reduced-type granites with spectacular coastal outcrops of magma mingling and even Miocene high-Mg andesites erupted through the basement granites.

Trip A4 visits the southern Kyushu where Miocene ilmenite-series granitoids were overlapped by the Pliocene-Quaternary magnetite-series volcanism in the Shimanto accretionary wedges. You will enjoy to observe I-type granites with abundant sedimentary enclaves, the highest-grade Au-quartz veins of the world at Hishikari, and active Sakurajima volcano along the present volcanic front.

In Trip B1 of the post-Symposium excursion, you can observe a section of the island-arc crust, which was formed by island-arc collision of the eastern and western Hokkaido. The world-freshest peridotite is also visited at Horoman. Trip B2 was initially planned to delineate Korean granites across the Peninsula. It is unfortunate that this plan was cancelled.

Among three mid-conference excursions, M1 takes you to the east of Toyohashi, exhibiting you the late Cretaceous Ryoke metamorphic and granitic rocks. Faults and cataclastic rocks are also visited. M2 brings you to north and northeast of Toyohashi, and shows you S-type like two-mica granite and I-type granodiorite, both reduced ilmenite series. M3 takes you some distance to the northwest of Toyohashi and visit high-level granites and coeval volcanic rocks of the San-yo Belt around the southeastern side of the largest Biwa Lake.

We would deeply appreciate the excursion leaders for arrangement of the field excursions and quick submission of the manuscripts. Although time available for this publication was limited, the manuscripts were reviewed with help of the following refrees, to whom we also acknowledge:

Masaaki OWADA (Yamaguchi Univ.), Masaki TAKAHASHI (Nihon Univ.), Takamoto OKUDAIRA (Osaka City Univ.), Teruyoshi IMAOKA (Yamaguchi Univ.), and Yoshikuni HIROI (Chiba Univ.).

The manuscripts were formalized in the publication format of the Bulletin of the Geological Survey of Japan, referring to editorial rules of the Geological Survey of Japan (http://intragsj.a07.aist.go.jp/gman/Naiki/14GSJ_MOU_1.html) and the Geological Society of Japan (EBJGSJ, 2003). Mineral abbreviations used here are those recommended by Kretz (1983).

Finally, we hope that all the participants enjoy the late summer field trips, and obtain fruitful and successful results. We wish you safety journeys.

August 8, 2003

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AIST, Tsukaba, Japan

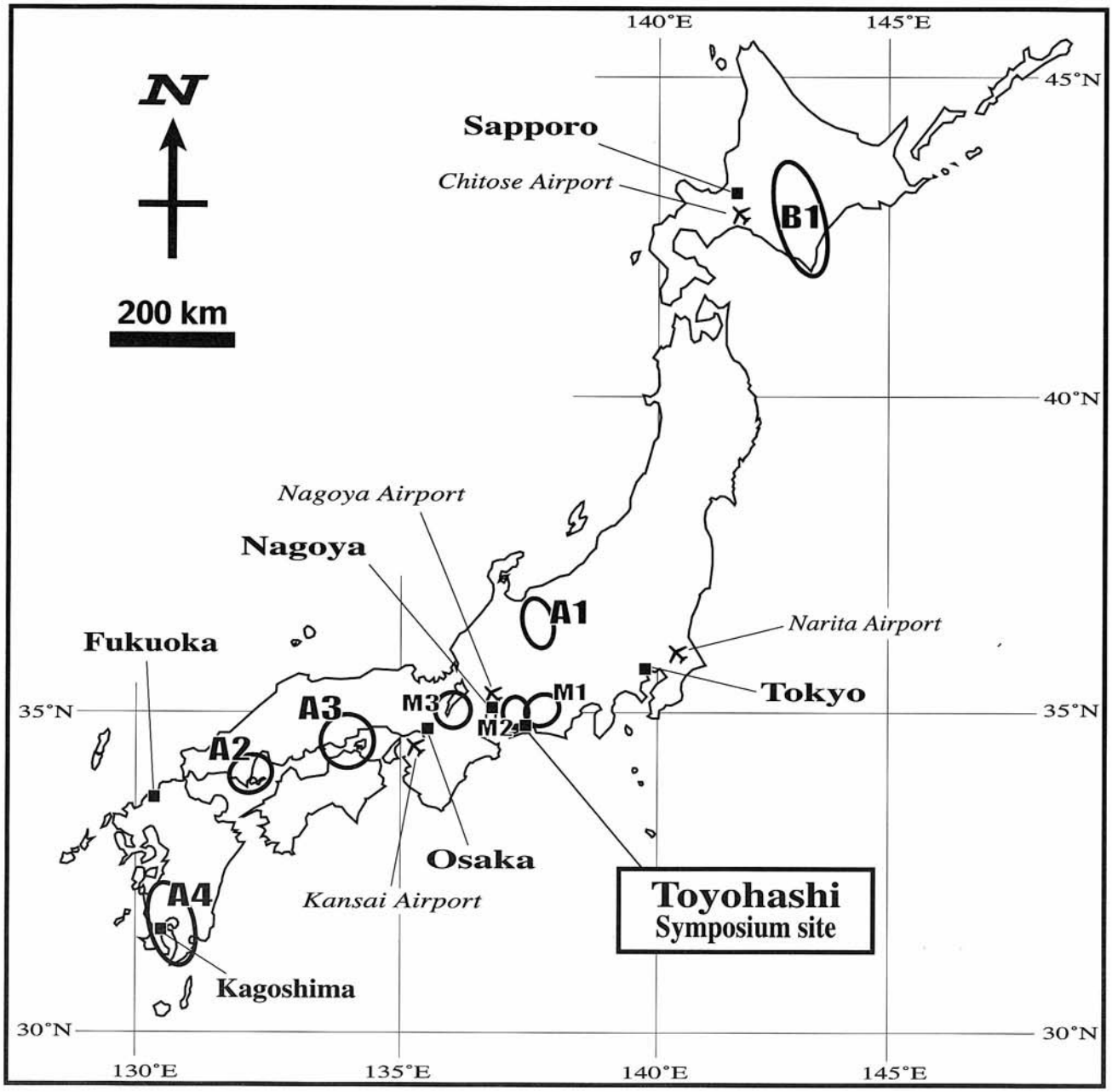
References

Editorial Board of the Journal of Geological Society of Japan (EBJGSJ) (2003) Instructions to authors. *Geol. Soc. Japan News*, vol. 6, no. 1, (1) - (12).*

Kretz, R. (1983) Symbols for rock-forming minerals. *Amer. Mineral.*, **68**, 277-279.

* in Japanese.

Index Map for the Field Excursions



A1-A4: pre-symposium excursions. B1: post-symposium excursion. M1-M3: mid-symposium excursions.