Special Issue: Geochemistry of Volatiles in the Solid Earth and Their Release to the Atmosphere

Preface

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This special issue consists of selected papers presented at the special symposium entitled “Geochemistry related to Degassing of the Solid Earth” which was held at the 53rd Annual Meeting of the Geochemical Society of Japan (September 13–15, 2006, Tokyo) and papers that have been newly written for this issue.

Volatile species in the solid earth play a vital role in helping us gain a better understanding of the origin and evolution of the atmosphere as well as of the mechanisms associated with subsurface events such as earthquakes and volcanic eruptions. The scientific importance of volatile species in the solid earth is universally acknowledged. However relatively few earth scientists are involved in studying the geochemistry of volatiles, because it is an interdisciplinary field that combines solid earth science and atmospheric science. Late Prof. George Igarashi of Tohoku University was a leading scientist who pioneered this new scientific field, but who most regrettably passed away on March 24, 2006, at the young age of 46. He studied volatiles in the solid earth by adopting an integrated approach and he wrote several important papers on various topics associated with the study of volatiles, including the origin of the atmosphere (Igarashi, 1995), mantle helium flux (Igarashi *et al.*, 1992), changes in the groundwater level due to earthquakes (Igarashi and Wakita, 1991) and the change in radon concentration of groundwater prior to the Kobe earthquake (Igarashi *et al.*, 1995).

In order to discuss the recent advances in geochemistry of terrestrial volatiles, the special symposium was held at the GSJ Annual Meeting (2006). A total of 13 papers were presented with the plenary address given by Dr. Minoru Ozima (Emeritus professor of the University of Tokyo) who introduced late Prof. Igarashi's selected works. We subsequently proposed that the editorial committee of the Geochemical Journal produce a special issue entitled “Geochemistry of Volatiles in the Solid Earth

and their Release to the Atmosphere”, expanding the scope of this special symposium and adding new contributors.

This issue consists of 10 papers including two review papers. One original paper and one review paper were newly contributed by researchers based overseas. **Kaneoka** reviews studies that used noble gases to investigate the structure and dynamics of the mantle and **Fischer** reviews studies into the volatile balance associated with subduction processes of the oceanic lithosphere. **Matsumoto *et al.*** discuss the characteristics of the argon isotopic feature of the plume source in the mantle. **Sano and Nakajima** examine subduction dynamics by combining ³He/⁴He data of deep fluids with seismic tomography data, while **Morikawa *et al.*** reveal the groundwater dynamics by combining ³He/⁴He data with local-scale hydrology data. Earthquake-related chemical changes in the groundwater are presented by **Pérez *et al.***, who discuss the possibility of using such changes to predict the dates of future earthquakes. **Tsunomori and Notsu** propose a new formula that describes chemical changes in groundwater. The chemical changes in the gas released from Nyos and Monoun lakes are discussed by **Kusakabe *et al.***, while **Ohba *et al.*** evaluate the sulfur isotope data of volcanic gas from Miyakejima volcano by considering the experimental results of isotope fractionation during dissolution in alkaline solution. **Mori and Notsu** discuss chemical data of gas emitted from Aso volcano measured by remote FT-IR spectroscopy, with an emphasis on the effect of volcanic eruption.

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