Preface

Many of the papers in this special issue are from the international session "Perspectives of Geomagnetism: Geodynamo, Paleomagnetism, and Rock magnetism—Tribute to Prof. Masaru Kono—(Conveners: Toshitsugu Yamazaki, Tadahiro Hatakeyama, Masaki Matsushima, and Yozo Hamano)" which was held at the Japan Geoscience Union Meeting 2006. Including those of later general contributions to this special issue, they represent a broad spectrum of recent advances in geomagnetism, paleomagnetism, and rock magnetism.

Geomagnetism is a multidisciplinary field encompassing the achievements of Masaru Kono who has pursued its many aspects, from rock magnetism to geodynamo theory. He is a rare geophysicist who excels both in experiments and in theory. Experimentally, he made enormous contributions to the study of paleointensity from volcanic rocks. Developing innovative magnetometers was also one of his research themes. In theory, he solved many basic statistical problems in paleomagnetism and later devoted his time to geodynamo theory. In this way, he has made profound contributions that form a bridge between paleomagnetism and geodynamo theory, which were not particularly close in the past. His other remarkable achievement is success in many worldwide fieldwork campaigns, including the legendary gravity measurements in the Himalayas as a member of Japan Mount Everest Expedition.

This special issue begins with a paper on geodynamo theory by Roberts and Kono himself which gives new insight into the available energy budget and also suggests an age for the formation of the inner core and the distribution of heat flow through the core-mantle boundary. In the next paper, Gubbins discusses possible stratification in the uppermost part of the outer core based on an analysis of the recent secular variation of the geomagnetic field. Takahashi *et al*. present a numerical study of a polarity transition for a quasi-Taylor geodynamo. Chambodut *et al*. discuss the temporal and spatial extent of geomagnetic jerks predicted by a global model of the geomagnetic field. Verbanac *et al*. investigate observatory crustal biases in Europe using core field model predictions.

Papers on paleomagnetism begin with Evans and Hoye who revisit the problem of testing the geocentric axial dipole hypothesis by analysing paleomagnetic inclination angles. In the next paper, Hatakeyama investigates the ABIC minimization method in stochastic inversion of paleomagnetic data in terms of the number of sites and data.

Methodology in paleointensity experiments from volcanic rocks is discussed in the next two papers. Hill and Shaw assess the merit of the Kono perpendicular method when applied to the microwave paleointensity technique. Biggin and Perrin demonstrate a new scheme to detect multidomain pTRM tails without explicit pTRM tail checks.

The following five papers report new contributions of paleointensities, paleodirections, and excursions. Yamamoto *et al*. give paleomagnetic results from the Brunhes-age Datong volcanic rocks in China, suggesting a low mean VDM. Tanaka *et al*. report Tertiary paleointensities from basaltic rocks in northeastern China. Mochizuki *et al*. describe a further study of K-Ar age determinations on the Auckland geomagnetic excursions and discuss the excursions and VDMs in the time interval 30-60 ka. Shibuya *et al*. report a newly found 197 ka excursion from the Unzen Volcano, Japan and discuss the VGP distribution of the Japan Brunhes dataset. Goguitchaichvili *et al*. give Miocene paleodirections from the Eastern Alkaline Provinces in Mexico and discuss the time-averaged field and a short normal polarity interval in the Matuyama Chron.

Papers involving the paleomagnetism of sediments begin with Yamazaki and Kanamatsu who give a new relative paleointensity record since 1.6 Ma from the North Pacific and suggest a geomagnetic origin to a $\sim$100 kyr period variation. Yokoyama *et al*. further examine the 100 kyr variation of the relative paleointensity records from the Pacific, including those of Yamazaki and Kanamatsu, by wavelet analysis. Hayashida *et al*. present a new record of paleosecular variation and environmental magnetism for the last 40 kyr from the Lake Biwa, Japan. Roberts *et al*. report a high-resolution record of a Miocene polarity transition from McMurdo Sound, Antarctica which reveals a rare detailed view of transitional field behavior.

Two papers on magnetostratigraphy follow. Yang *et al*. report paleomagnetism and rock magnetism of Pliocene and Pleistocene Chinese loess-paleosol sediments and suggest that excursions occurred in the Matuyama Chron as frequently as in the Brunhes Chron. Turner *et al*. describe the paleomagnetism of Miocene sediments in New Zealand which reveals six geomagnetic reversals together with a clear record of cryptochron C5Dr-1.

Wack and Matzka describe a new spinner magnetometer for continuous measurements at high temperatures, termed Hotspin 2, with a novel off-axis design. Saito and Ishikawa present the results of their magnetic petrology study applied to lava samples from the dome of Unzen volcano, Japan and deduce some implications concerning magma mixing during the 1991–1995 eruption.

The following two papers report studies of tectonics. Hoshi and Teranishi carried out a paleomagnetic study of the Middle Miocene Ishikoshi andesite, Japan and discuss the timing of the rotation of northeast Japan. Uto *et al*. report 52 K-Ar ages from the Society Islands, French Polynesia and discuss magnetostratigraphy and paleomagnetic poles that imply a rather fixed hotspot position.

The final two papers are studies of magnetic anomalies. Kato *et al*. report magnetic surveys by a deep-tow three-component magnetometer in the Tsushima and Japan Basins and discuss the origin of the magnetic anomalies revealed. Ueda analyses

seamount magnetizations in the Izu-Ogasawara arc and discusses the origin of their normal polarity bias.

These 26 papers span the whole range of geomagnetism and constitute a fitting tribute to the achievements of Masaru Kono and demonstrate that this field continues as vigorously as ever.

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