Preface

This special issue of Earth, Planets and Space contains 21 contributed papers related to the 1st SELENE (SELenological and ENgineering Explorer) Science Working Team meeting, which was held at Tsukuba Space Center of Japan Aerospace Exploration Agency during 9–11 January, 2007.

The Japanese lunar polar orbiter SELENE (now named as "Kaguya" after the lunar princess in the Japanese tale "Bamboo Cutter") was successfully launched by the 13th H-IIA launch vehicle on 14 September 2007, inserted into lunar polar circular orbit on 3 October 2007, and started its nominal observing mission in December 2007.

The stated objective (Sasaki *et al.*, 2003; Kato *et al.*, 2008) of this lunar science mission is to carry out observations from lunar orbit to further our understanding in the areas of lunar origin and evolution, surrounding environments. Emphasis is also placed on technology demonstration to reach and orbit the Moon as well as education and public outreach.

Lunar science, that is the science of/on/from the Moon, is now investigated with the SELENE mission. A variety of experiments are being carried out using 14 onboard instruments and 2 sub-satellites. Investigations of high resolution geologic and topographic features, mineral and elemental composition, structures of subsurface interior, precise gravity and magnetic fields are conducted on global scale. Lunar surrounding environments of charged particles, cosmic rays, and tenuous exospheric conditions are also analyzed. In addition, the terrestrial aurora and exosphere, cosmic radio waves are studied from lunar orbit. High definition television has captured "Earth-rises" and "Earth-sets", which fascinate the public, but also provides unusual new insights in the various lunar landscapes.

SELENE is the largest-scale lunar mission since the Apollo era and conducts 15 observation experiments in the highest precision and resolution ever. Thus, the mission will provide a flood of new data which will significantly contribute to moving lunar science beyond foundations laid by Apollo and subsequent global mapping missions (Clementine, Lunar Prospector, and SMART-1). Data analysis of each instrument, interdisciplinary sciences, and related new techniques for data analysis, laboratory and numerical studies will lead us to new views of the Moon.

Highlights of this special issue are the detailed descriptions of instrumentation and their calibrations before launch, discussed by ten papers. In addition, four papers numerically simulate various phenomena expected to be happening on the Moon. Three papers show new experimental data and analytical methods that provide new insights. The other four papers discuss the scopes of lunar science with the data analysis of the past mission, earth-based observation of the Moon, and lunar meteorite studies. Those preparations of analysis are also crucial to interpret the data. We believe these papers are useful to understand the SELENE mission, its instrumentation, and the data analysis not only for the SELENE people but also for anybody interested.

We wish to thank all the participants of the meeting. We gratefully acknowledge the authors and reviewers for their efforts to publish this EPS special issue of SELENE "Kaguya".

Guest Editors: Tatsuaki Okada
Manuel Grande
Juergen Oberst
Noriyuki Namiki

Reference

Kato, M., S. Sasaki, K. Tanaka, Y. Iijima, and Y. Takizawa, The Japanese lunar mission SELENE: Science goals and present status, *Adv. Space Res.*, doi:10.1016/j.asr.2007.03.049, 2008 (in press).

Sasaki, S., Y. Iijima, K. Tanaka, M. Kato, M. Hashimoto, H. Mizutani, and Y. Takizawa, The SELENE mission: Goals and status, *Adv. Space Res.*, **31**, 2335–2340, 2003.