

## Preface

This special issue of Earth, Planets and Space contains five contributed papers related to the 3rd Kaguya (SELENE) Science Working Team meeting, which was held on 14–15 January 2009 at the Campus Innovation Center Tokyo, Minato-ku, in Tokyo, Japan. Kaguya is originally known as SELENE (SELEnological and ENgineering Explorer), the Japanese lunar orbiter mission for the purpose of lunar science and future lunar utilization.

The Japanese lunar polar orbiter 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, started its nominal observing mission in December 2007, followed by the extended mission from November 2008 and the final controlled descent to the lunar surface on 10 June 2009.

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, as well as lunar 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, has been investigated with the newly obtained data by the Kaguya mission. A variety of experiments have been carried out using 14 onboard instruments and 2 sub-satellites OKINA and OUNA. Investigations of high resolution geologic and topographic features, mineral and elemental composition, structures of subsurface interior, precise gravity and magnetic fields have been conducted on global to local scale. Lunar surrounding environments of charged particles, cosmic rays, and tenuous exospheric conditions have been also analyzed. In addition, the terrestrial aurora and exosphere, cosmic radio waves were studied from lunar orbit. High definition television has captured “Earth-rises” and “Earth-sets”, which fascinated the public so much, but also provided unusual new insights in the various lunar landscapes.

Kaguya is the largest-scale lunar orbiter mission since the Apollo era and carried out 15 observation experiments in the highest precision and resolution ever. The mission has successfully provided a flood of new data which significantly contribute to constructing new lunar science beyond Apollo and subsequent global mapping missions (Clementine, Lunar Prospector, and SMART-1). Kaguya data has been released via website to anyone interested for investigating the new lunar science.

Highlights of this special issue are some of newly analyzed products using the Kaguya data. Global high-resolution imagery and precise gravity mapping are among the most important achievements in this mission. Morota *et al.* shows the timing and duration of volcanism, and Fok *et al.* describes the topic of precise topography. Both of them realized with the Kaguya data. Analysis of data from Gamma-ray spectrometer by Ota *et al.* gives a new interpretation of cosmic-ray interaction with the Moon. Plasma physics around the lunar environments as well as in the terrestrial magnetosphere were also newly observed and interpreted by Nakagawa *et al.* and Goto *et al.* with the Kaguya data. We believe these papers are useful to report some of the scientific achievements by Kaguya, and to promote the Kaguya data to be investigated not only for the Kaguya 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 “Kaguya”.

Guest Editors: Tatsuaki Okada  
Manuel Grande  
Juergen Oberst  
Sho Sasaki

## References

- Kato, M., S. Sasaki, K. Tanaka, Y. Iijima, and Y. Takizawa, The Japanese lunar mission SELENE: Science goals and present status, *Adv. Space Res.*, **42**, 294–300, 2008.
- 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.