

PREFACE

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# Special issue “Geospace exploration by the ERG mission”

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The exploration of energization and radiation in geospace (ERG) project was developed to understand the fundamental physical processes operating in the Earth's inner magnetosphere. A summary of the ERG project is given in this special issue by Miyoshi et al. (2018a). A central component of this project is the spacecraft Arase, named after the Arase River near the ISAS launch range, (ERG). Arase was launched on December 20, 2016, and it has been operating in a highly elliptical orbit with apogee of 6  $R_E$  and an inclination of 31°. A brief history of the spacecraft development and the technical features of the spacecraft system are given by Nakamura et al. (2018). The spacecraft has an innovated mission network system described by Takashima et al. (2018). Arase hosts nine state-of-the-art scientific instruments to make in situ observations of particles and fields. The multiple instruments for electron measurements are introduced by Kazama et al. (2017), Kasahara et al. (2018a, b), Mitani et al. (2018), and Higashio et al. (2018). The instruments for ion measurements are introduced by Asamura et al. (2018) and Yokota et al. (2017). The magnetic field measurements are described by Matsuoka et al. (2018), and descriptions of the wave and electric fields are provided by Kasahara et al. (2018a, b), Kasaba et al. (2017), Kumamoto et al. (2018), Ozaki et al. (2018), and Matsuda et al. (2018). The interactions between particles and waves, a critical aspect of the physics of the inner magnetosphere, are diagnosed with a software-type wave-particle interaction analyzer, introduced by Katoh et al. (2018) and Hikishima et al. (2018). The ERG project includes a ground-based observation network that is summarized

by Shiokawa et al. (2017). Other key aspects of the ERG project are a program of theory, modeling, and integrating studies described by Seki et al. (2018), and a data processing center called the ERG Science Center, described by Miyoshi et al. (2018b). An example of the data analysis tool development is introduced by Keika et al. (2017). All of these elements together are expected to yield major advancements in our understanding of acceleration, transport, and loss of relativistic electrons in the radiation belts.

#### Authors' contributions

All authors of this article served as guest editors for this special issue. All authors read and approved the final manuscript.

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The authors declare that they have no competing interests.

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