

PREFACE

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Special issue “20th anniversary issue: earth, planetary, and space science in the next decade”

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This special issue is for the 20th anniversary of the journal, *Earth, Planets and Space (EPS)*, which was established in 1998 as a continuation of the two journals, *Journal of Geomagnetism and Geoelectricity (JGG)* and *Journal of Physics of the Earth (JPE)*. In 2014, we started an open-access publication under the SpringerOpen platform (Ogawa 2014). To commemorate the 20th anniversary and to aim for the future development of relevant frontier research, this special issue is dedicated to the emerging topics on earth and planetary sciences in the next decade, within the scope of the five supporting societies.

Aoi et al. (2020) introduced the newly established seismic monitoring system MOWLAS (Monitoring of Waves on Land and Seafloor), which started operation in 2017 all over Japan including land and sea floor. MOWLAS combined the previous land and seafloor observation networks with the new seafloor observation system (S-net) and can cover the area from the trench. It will become a new powerful research infrastructure for earthquake sciences and disaster mitigation.

Geshi (2020) described the importance of risk estimation of large-scale volcanic eruptions, which are rare

but can cause disastrous damage to social infrastructure in a large area. Focuses were put on the future research objectives to study large-scale eruptions, in particular geophysical imaging of the large magma storage, geochemical and petrological mapping and monitoring of volcanic gas and magma, and eruptivity study of the magma chambers.

Heki (2020) reviewed the history of geodesy in Japan, highlighting three pioneers, Tadataka Ino, Torahiko Terada, and Hisashi Kimura, and described how these early geodetic observations can be measured by modern geodesy. He also previewed the interdisciplinary role of space geodesy in Japan.

Omura (2021) described nonlinear processes associated with the generation of chorus and hiss waves, which control the dynamics of energetic electrons in the Earth's magnetosphere. He shows that the inhomogeneity factor due to the frequency variation and the gradient of the magnetic field plays a critical role in the generation process of rising-tone and falling-tone wave packets and associated electron acceleration and scattering. The paper is based on the past 15 years' theoretical developments. It also derives the formulas that have not been published previously.

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