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Preface

This special issue of Earth, Planets and Space presents papers related to the International Reference Ionosphere (IRI) workshop held in Kagoshima City, Japan in 2009. The International Reference Ionosphere (IRI) project and working group was established in 1968 jointly by the Committee on Space Research (COSPAR) and the International Union of Radio Science (URSI). The group was tasked to produce an observation-based standard model of the ionosphere, because the performance of communication and global positioning systems are significantly affected by the ionosphere. The IRI working group is composed of experts from various countries from all over the world who are constantly working on the construction and improvement of the IRI model. The model software and information about the model are accessible from the homepage of IRI, http://iri.gsfc.nasa.gov/. The IRI model is widely used in various areas, such as ground radio communication, satellite communication, forecasting of disturbances in telecommunication, navigation and positioning of aircrafts, ships, and ground vehicles using GPS. In addition, it is used to calibrate space observations obtained using radio waves as well.

The structure and variation of the ionosphere is strongly affected by the solar activity and the solar wind from above. Recent research has revealed compelling evidence for influences from below as well. The sources of influence are meteorological changes in the troposphere like lighting and rainfall, or even earthquakes deep inside the solid Earth. As an empirical model the IRI includes these influences from above and below. The IRI model is based on ionospheric data obtained by ionospheric sounders, incoherent scatter radars, satellite and rocket measurements, and GPS TEC measurements. The sparse ionospheric data coverage in some Asian and African regions limits the accuracy of the IRI model in these regions. This special issue includes important new results from data obtained in the Asian-African region and first steps towards IRI improvements.

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