# 1 Research on a System for Monitoring, Analyzing, and Forecasting of the Space Environment

KIKUCHI Takashi

In the 21st century, an age of widespread space-based endeavors, satellite communication, broadcast, and positioning applications have become an essential part of our social and economic activities. Furthermore, opportunities for manned space activities are increasing, such as through the utilization of the International Space Station, and in the future, space tourism may become a reality.

Accordingly, the CRL has been pursuing research to develop technologies to monitor, analyze, and forecast variations in numerous space weather phenomena, in order to sustain a high-tech society that relies heavily on satellite technology. An additional goal of such research is to minimize human exposure to radiation during manned space activities. The Special Issue of Space Weather Forecasting I (Sept. 2002 issue) presented the results of research concerning variations in the space environment that interfere with normal satellite operation. The present issue is a compilation of the results of research focusing mainly on the development of technologies for monitoring, analyzing, and forecasting the space weather.

This issue consists of two parts: the first deals with the development of technologies relating to the sun and solar winds, the magnetosphere, and the ionosphere and thermosphere; the second deals with the development of technologies to be applied to systems of collecting and distributing space weather information. The section on the sun and solar winds presents the results of optical and radio observations of solar surface phenomena that cause space environment variations, in addition to the results of studies on the methods of predicting the arrival time at the Earth of solar surface disturbances. This section also contains a paper regarding a project involving observation of coronal gas (coronal mass ejections) using solar-orbiting satellites. The section on the magnetosphere consists of a paper on a receiving system for satellites that perform direct observation of solar wind disturbances, another paper on the development of instrumentation and satellite data-acquisition system to observe various magnetospheric phenomena, and a paper on a system for monitoring magnetosphere-ionosphere disturbances using ground magnetometer networks. The section on the ionosphere and the thermosphere presents papers on the technology for total electron content (TEC) of which variations cause errors in positioning, and on the observation of ionospheric variations. The second part of this issue, dealing with information services, consists of papers on a remote control system for ionospheric observation and a system for the distribution of space weather information. We hope that this issue, together with Special Issue I, will contribute to a deeper understanding of the space weather phenomena that occur between the sun and the Earth and of the methods for monitoring, analyzing, and forecasting these phenomena.

***KIKUCHI Takashi**, Ph. D.*

*Research Supervisor, Applied Research and Standards Division*

*Magnetosphere-Ionosphere Physics*