Near real-time geomagnetic data acquisition from high latitudes and its utilization for space weather nowcasting and forecasting

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As the energy flow from the magnetosphere into the ionosphere occurs mainly at high latitude region, it is important to monitor geomagnetic disturbances there. Real time global monitoring of the disturbances was not possible in the past due to significant delay in the delivery of magnetometer data, for example from Siberia. In this paper we report on a project that successfully reduced the delay for four Siberian stations. The name of the project is [The Project for Upgrading the Russian AE Stations (PURAES) in cooperation with Space Weather Magnetometer Experiments (SWME)]. The participants to the project are the Arctic and Antarctic Research Institute (AARI), the Institute for Dynamics of Geospheres, Russian Academy of Sciences (IDG), the Communications Research Laboratory (CRL), the World Data Center for Geomagnetism Kyoto (WDC Geomagnetism Kyoto), the Applied Physics Laboratory, Johns Hopkins University (APL), and the Geophysical Institute, University of Alaska Fairbanks (GI). Near real-time data link was completed by the summer of 2002. Data from Siberia are relayed to Japan via the Japanese meteorological satellite GMS-5 operated by the Japan Meteorological Agency. The WDC Geomagnetism Kyoto is using the data to improve the quality and delivery timing of the quicklook AE index. Upgrade of quicklook AE index to near real-time AE index is in progress through collaboration between CRL and WDC Geomagnetism Kyoto. The CRL operates the Regional Warning Center JAPAN (RWC Japan), as part of the International Space Environment Service. The RWC Japan is using the data for routine nowcasting and forecasting of geomagnetic activity. The integrated data viewing-analyzing system in the Center is also reported in this paper.

Near real-time data from four Siberian stations are also useful for space weather research. CRL operates the HF radar at King Salmon, Alaska, as one of the members of the super Dual Auroral Radar Network (SuperDARN). The radar can observe the ionospheric convection above the easternmost Siberian geomagnetic station. Comparison between the horizontal electric field derived from the radar observation and the geomagnetic variation observed by magnetometer would be interesting. On the other hand, no radar of SuperDARN can observe the convection above three Siberian geomagnetic stations excepting the easternmost geomagnetic station. Geomagnetic data of these stations would provide complementary information on global convection. Several Japanese geostationary satellites have their geomagnetic foot print near the Siberian geomagnetic stations. Geomagnetic disturbances detected by these stations would be useful information for operators of these satellites.