4th Asia-Pacific Conference on Plasma Physics, 26-31Oct, 2020, Remote e-conference

Recent progress on space weather missions in Korea

Jongho Seon[1]
[1] Department of Astronomy and Space Science, Kyung Hee University
e-mail (speaker): jhseon@khu.ac.kr

We present a recent observation of charged particles and magnetic fields in the Earth's outer radiation belt as measured with a suite of instruments aboard a geostationary satellite over the Korean peninsula at a geographic longitude of 120.2°E. We describe a moderate sized geomagnetic storm observed in May 2019. For a description of the event, we utilize measurements from particle detector (PD) instrument[1]and service-oriented space magnetometer (SOSMAG)[2] aboard GK2A satellite.

The PD experiment consists of three sensors with different viewing angles relative to the spacecraft. Each sensor of the PD consists of two telescopes that are mechanically configured back-to-back with a field-of-view of 20° ×20° and measures electrons and ions, using silicon detectors equipped with foils and magnets for the separation of ions and electrons. The energy ranges of the sensor for electrons and ions are 100–3800 keV and 148–22500 keV, respectively. A particular emphasis on electron measurement is given by allocating more than 40 energy bins in the measured energy range, whereas about 20 energy bins are allocated for ion measurements. The SOSMAG instrument measures the Earth's magnetic fields by avoiding magnetic cleanliness requirements for the hosting spacecraft. The instrument autonomously corrects on-board the dynamic stray fields generated by the hosting spacecraft. The instrument utilizes two science grade fluxgate sensors on an approximately one meter long boom and two additional magnetoresistance sensors mounted within the spacecraft body.

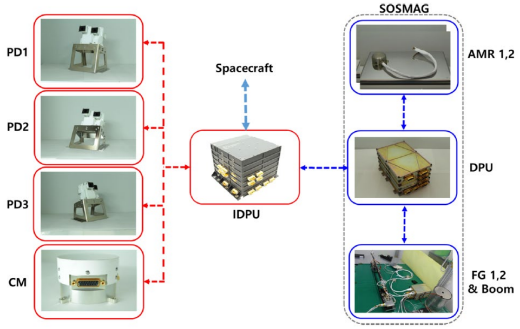

Fig. 1. Particle Detectors (PDs), a Charging Monitor (CM) and a Service Oriented Space Magnetometer (SOSMAG) aboard a geostationary satellite GK2A longitude of 128.2°E[1].

On 11 May 2019, the PD measured increase of relativistic electron fluxes. The geomagnetic indexes of D_{st} and K_p for this day were in the range of $-21 < D_{st} < -51$ nT and $Kp < 5^{o}$. These geomagnetic indexes suggest a moderately disturbed magnetosphere. The response of the PDs show that there has been a significant increase of relativistic electron fluxes after ~1200 UT, whereas such relativistic fluxes, especially in the energy range above ~ 800 keV, were not present before ~1200 UT. Note that Both the ions and electrons show energy-dependent dispersion, with higher-energy particles arriving earlier. By 2300 UT, all electron measurements of PDs show enhanced fluxes of relativistic electrons extending up to ~3000 keV. We will also summarize the observations from other satellites to assess the morphology the Earth's magnetosphere during this geomagnetic event.

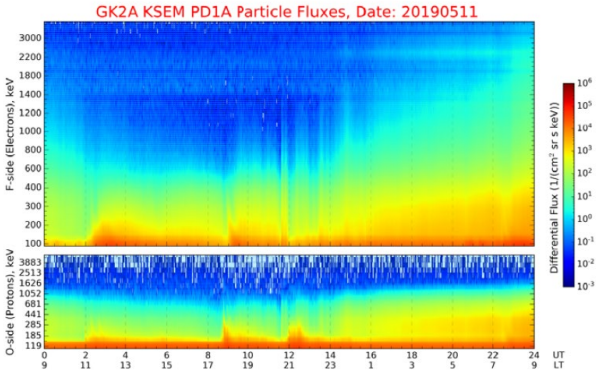

Fig. 2. Response of ions and electrons from the PD instrument on 11 May 2019. The electron response shows significant increases of relativistic fluxes from about 1200 UT with different timing of ions and electrons at lower energies.

References

[1] Seon *et al.*, Space Science Reviews, 216:13 (2020).
[2] Magnes *et al.*, Accepted for publication in Space Science Reviews (2020).