PARM: Investigation of precipitating high-energy electrons into the auroral ionosphere with sounding rockets

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Bursty precipitations of high-energy electrons into the polar ionopshere have been observed by low-altitude satellite, for example, SAMPEX and FIREBIRD II. These precipitations, called microburst, may contribute to the loss of the terrestrial radiation belt through the collisional energy loss with the dense, cold atmospheric particles. Recent numerical simulations successfully reproduce these microburst precipitations with a few Hz modulations by taking into account the pitch angle scattering with the whistler chorus elements at off-equator regions in the inner magnetosphere. Therefore, one can expect that the miscroburst precipitations have properties depending on auroral activities especially the pulsating auroras. In order to investigate the mechanisms of the microburst precipitations by in-situ observations, we are developing two instrument packages: PARM (Pulsating AuRora and Microbursts; already developed) and PARM-2 (being developed), both of which are designed suitable for sounding rocket experiments. PARM consists of four sensors; HEP (high-energy electron energy spectrometer), MED (medium-energy electron detector), AIC (auroral camera), and AFG (ASIC-based fluxgate magnetometer). PARM was onboard the NASA's RockSat-XN sounding rocket, and launched from Andoya, Norway at 09:13UT, Jan 13, 2019. On the other hand, PARM-2 is under development. It consists of HEP, two AICs, and MIM (magneto-impedance magnetometer). PARM-2 is to be onboard the NASA's LAMP sounding rocket which will fly from Poker Flat, Alaska in the period between the end of 2019 and the beginning of 2020.

We will present the overview of PARM missions including the initial results of RockSat-XN/PARM with ground-based observations and preparation status of LAMP/PARM-2.

Keywords: electron microburst precipitation, sounding rocket, pulsating aurora

