Analysis of impulsive noises observed by SS-520-2 sounding rocket

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SS-520-2 sounding rocket was launched from Norway on Dec. 4, 2000 to observe plasma acceleration and heating processes in the low altitude polar region. The rocket reached the altitude of 1108km, and obtained 1150sec clear observation data. We are analyzing DC electric fields and ELF band waves observed by EFD(Electric Field Detector) onboard SS-520-2 rocket. EFD is a subsystem of PWA(Plasma Wave Analyser), and is designed to observe DC electric fields and ELF plasma waves with frequencies of 0-50Hz. Through all this rocket experiment, EFD worked properly and succeeded to obtain clear electric field data.

In the almost all EFD data, impulsive noises are observed. These pulses are assumed to be generated due to the photo electron emission, synchronizing with the rocket spin frequency. Judging from the trajectory of SS-520-2 rocket, the rocket was irradiated by the sun and effected by the photo electron emission during all the observation time of EFD. The amplitudes of the photo electron pulses are expected to be related to the local plasma environment, e.g. electron density and temperatures. Though the amplitudes of impulsive noises are in inverse proportion to the altitudes of the rocket, however, we can find no clear relation, especially in the F region of the ionosphere (500-300km in the altitude), where the electron density increase suddenly.

According to the previous study about photoelectron pulses observed by Akebono satellite, the photoelectron pulses are related to the direction of the ambient magnetic field rather than that of the Sun. We investigated the angles between the direction of wire antenna, when impulsive noises are observed, and that of the Earth's magnetic field, by use of MGF data. As a result, we confirmed that the impulsive noises are observed when the wire antenna become almost parallel to the Earth's magnetic field. This indicates that the photo electron pulses observed by SS-520-2 rocket are also related to the direction of the ambient magnetic field rather than that of the Sun, as previously indicated with using the data of Akebono satellite. We are going to make a statistical study of the amplitudes and duration periods of photo electron pulses and their relation to the Earth's magnetic fields in detail.