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Spatial distribution of high-energy electrons in solar flares

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Abstract. GEMSIS (Geospace Environment Modeling System for Integrated Studies) is a project in Solar-Terrestrial Environment Laboratory, Nagoya University. Its final goal is to build a geospace-environment model based on various (satellite and ground-based) observational data in order to understand the dynamic energy-transport-processes taking place in geospace. One of the working teams in this project, GEMSIS-Sun is developing a model to calculate transportation/acceleration processes of particles in solar flares. From this calculation, we can derive the information about the energy spectrum and pitch-angle distribution of particles anywhere in a flaring region. Through some models for radiation, we can compare the calculation results with actual observational results. One of the interesting observations to compare with calculations is the height distribution of accelerated electrons in the flare magnetic field. Hard X-rays are emitted from high-energy (a few tens of keV to a few hundreds of keV), and microwaves are emitted from higher-energy (a few hundreds keV to a few MeV) electrons. Hard X-ray images are derived with RHESSI and HXT on board Yohkoh observations, and microwave images are derived from the Nobeyama Radio Heliograph. We chose several large-scale intense flares occurring near the solar limb. Then we statistically investigated the heights of looptop sources observed in hard X-ray and microwaves. It is found that a hard X-ray looptop source tends to be located at a higher altitude than the corresponding microwave source. We discuss the various processes (acceleration, transport, loss, and radiation) reflected in this result. For further studies, the realistic coronal magnetic field structure and the density distribution in the coronal loops are needed. Hinode significantly contributes in this part.