Relationship between a hard X-ray source and a microwave source located around the apex of the flare loop

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GEMSIS (Geospace Environment Modeling System for Integrated Studies) is one of the projects 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 facts in order to understand the dynamic energy-transport-processes taking place in geospace. The GEMSIS-Sun team is mainly developing a model to calculate transportation/acceleration processes of particles under the magnetic reconnection site in solar flares. From this model, we can derive the information about the number/energy/pitch angle of particles in a two-dimensional space. Through some radiation model, 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 system. Hard X-rays are emitted from the high-energy (a few tens of keV to a few hundreds of keV) electrons, and microwaves are emitted from higher-energy (a few hundreds keV to a few MeV) electrons. Hard X-ray images can be derived with RHESSI and HXT on board Yohkoh observations, and microwave images can be derived from the Nobeyama Radio Heliograph. We chose several large-scale intense flares which were observed with above instruments and which occurred near the solar limb. Then we statistically investigated the heights of a hard X-ray looptop source and a microwave looptop source. It is found that a hard X-ray looptop source tends to be located at a higher altitude than that of the corresponding microwave sources. In this presentation, we discuss this result.