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Imaging observations of a solar flare with RHESSI and Nobeyama Radio Heliograph

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The combination of RHESSI and Nobeyama Radio Heliograph (NoRH) is a very useful to study the behavior of accelerated electrons in the solar corona during the impulsive phase of solar flares. Among the flares observed with both instruments, an M-class flare occurred on 18 July 2002 is selected and analyzed with a focus on the evolution of the hard X-ray and micro-wave sources. At the peaktime, a double source structure is observed in hard X-rays (30 - 50 keV) and the south-east (SE) source is much weaker than the north-west (NW) source. At the same time, in the 34 GHz map, there is a loop structure connecting the two hard X-ray sources and the SE end of the loop is much brighter than the other end. This kind of complementary relationship between hard X-rays and microwave has often been reported previously. It is believed that the asymmetry of the magnetic intensity at the two footpoint region of the flare loop, causes this complementary structure. The microwave becomes intense at the intense magnetic field. On the other hand, at the same footpoint region, the magnetic mirror effect works efficiently, then hard X-ray emission, produced by precipitation of accelerated electrons, is weaker there. The observational result at the peaktime is well fitted to this scenario. However, at the beginning of the flare, the NW source is intense both in hard X-rays and in microwave. This can not be explained by the scenario above. According to EUV observations with TRACE, there are a few tiny loops in the NW region, in addition to the large-scale loop connecting between the NW and SE hard X-ray sources. The hard X-ray and microwave NW source may include not only the footpoint of the large loop, but also these tiny loops because of their poor spatial resolutions. This observation suggests that these tiny loops play an important role at the beginning of the flare. Sometimes a solar flare occurs in the active region located at one footpoint region of the corresponding CME. The situation, i.e., interaction between large- and small-scale magnetic field, is similar to this event though the spatial size is much different each other. The detailed analysis of this type of flares might provide some hints to solve the CME trigger problem.