

Preare Features in Radios and in Hard X-Rays

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We present a detailed examination on the nonthermal emissions during the preflare phase of the X4.8 flare which occurre on 2002 July 23. The microwave (17 GHz and 34 GHz) data obtained with Nobeyama Radioheliograph, at Nobeyama Solar Radio Observatory, National Astronomical Observatory of Japan, and the hard X-ray data taken with *Reuven Ramaty High Energy Solar Spectroscopic Imager* obviously showed nonthermal features.

We examined the temporal, spatial, and spectroscopic features on the emission sources, and found the loop-top sources during the preflare phase both in hard X-rays and in microwaves. Moreover, we found that the electron spectral index derived from microwave the emission index almost corresponds to that obtained from the hard X-ray emission index. We also discuss the energy release mechanism in the preflare phase.

Keywords: Sun: corona; Sun: flares; Sun: particle acceleration; Sun: radio radiation; Sun: X-rays; Sun: preflare.

References

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