R010-10
Zoom meeting C ：11/4 AM1 (9:00-10:30)
09:45-10:00

Validation of Extreme Ultraviolet Emission Spectra During Solar Flares

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X-rays and extreme ultraviolet (EUV) emissions from solar flares rapidly change the physical composition of the Earth's thermosphere and ionosphere, thereby causing space weather phenomena such as communication failures. To predict the effects of flare emissions on the Earth's upper atmosphere, numerous empirical and physical models have been developed.

We verify the extent of reproducing the flare emission spectra using a newly developed simple method based on the physical process of the flare loop (Kawai et al., 2020). In this method, we convert the soft X-ray light curves observed during flare events into EUV emission spectra using a one-dimensional hydrodynamic calculation and the CHIANTI atomic database.

To verify the proposed method, we use the observed EUV spectra obtained by the extreme ultraviolet variability (EVE) on board the Solar Dynamics Observatory (SDO).

We examined the “EUV flare time-integrated irradiance" and “EUV flare line rise time" of the EUV emissions for 21 the events by comparing the calculation results of the proposed method and observed EUV spectral data.

Proposed method succeeded in reproducing the EUV flare time-integrated irradiance of the Fe viii 13.1 nm, Fe xviii 9.4 nm, and Fe xx 13.3 nm, as well as the 5.5-35.5 nm and 5.5-13.5 nm bands. For the EUV flare line rise time, there was acceptable correlation between the proposed method estimations and observations for all Fe flare emission lines.

These results demonstrate that the proposed model can reproduce the EUV flare emission spectra from the emitting plasma with relatively high formation temperature.

This indicates that the physics-based model is effective for the accurate reproduction of EUV spectral flux.