Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

PEM029-04 Room: 303 Time: May 25 09:51-10:04

Statistical study of explosive energy release phenomena in quiet regions of the Sun.

Yuko Hada[1*], Hiroaki Isobe[2], Daikou Shiota[3]

[1]Nihon University, [2]Unit for Synergetic Study for Space, [3]STEL, Nagoya University

In the solar corona, there are many explosive phenomena in which magnetic energy is transiently released such as solar flares in active regions . in active regions. Solar flares show a power-law distribution between their energy scales and occurrence rates. The power-law index may reflect some information of the energy injection and release, but the details are still unknown. On the other hand, explosive phenomena similar to solar flares also occur in quiet region and they have not studied statistically yet. Examination of the difference in statistical properties of explosive phenomena in active and quiet regions may give some clues to reveal not only physics of explosive phenomena their selves but also energy injection and release processes.
In this study, we surveyed explosive phenomena in quiet region during the terms near solar maximum (Jan, 1999) and in solar minimum (Jan, 1995) using Soft X-ray full disk images observed with Soft X-ray Telescope (SXT) aboard Yohkoh satellite. We detected 220 events in solar minimum 163 events near solar maximum and calculate occurrence rate of them as functions of their spatial scales or soft X-ray intensity. The both profiles show power-law distribution, and the power-law indices of spatial scales are 1.7-1.8, which are similar to those of solar flares (1.5-1. 8). The power-law index of the function of soft X-ray intensity Jan. 1999 data shows 1.4 which is a little that of flares, while those in 1995 shows 1.6 similar to that of flares. The difference in the power-law indices of soft X-ray intensity implies that there may be some difference in energy injection process. We also compared the absolute values of the occurrence rate in the solar maximum and near the solar maximum, and found they are comparable. This implies that the occurrence rate is independent of the solar cycle.

Keywords: Solar flares, Quiet region, Giant arcades, Solar corona