

Statistical study for X-ray jets occurred in the polar region

Nobuharu Sako

Tokai University

Masumi Shimojo

Nobeyama Solar Radio Observatory, NAOJ/NINS

Teruyuki Kitabayashi

Tokai University

Abstract. The X-Ray Telescope(XRT) aboard Hinode had revealed that X-ray jets in the polar region occur at the high frequency. Savcheva et al. (2007) studied 104 X-ray jets occurred around the south pole and reported the parameters of the jets. However, their study included only the jets that occurred in the coronal hole. In order to reveal the properties of the polar X-ray jets in not only coronal hole but also quiet region, we detected 870 polar X-ray jets occurred around the north pole, and investigated the jets statistically.

The 487 jets in the 870 events occurred in the coronal hole. The occurrence rate of the jets in the coronal hole and the quiet sun is 5.01×10^{-12} jets/hr/km² and 7.89×10^{-12} jets/hr/km² respectively. It shows that the quiet region is more productive of X-ray jets than the coronal hole.

We derived five parameters of the polar X-ray jets, and the average of the parameters are 2.70×10^4 km for the maximum length, 4.20×10^3 km for the width, 614 sec for the lifetime, 180 km/sec for the apparent velocity and 914 DN/sec for the X-ray intensity of the footpoint flare. The time and length scale of the jets is smaller than that in Savcheva et al. (2007). It is not caused by the difference of the pole. The reason for the difference is that we could detect smaller jets than the previous work because we used not only X-ray intensity images but also the running difference images for detecting the jets. We derived also the frequency distribution of the parameters and found that the distribution of the lifetime and the X-ray intensity of the footpoint flare show the power-law distribution. The power-law index of the lifetime is -4.09 ± 0.55 , smaller than the index derived from the jets that occurred near the active regions (Shimojo et al. 1996). On the other hand, the power-law index of the X-ray intensity of the footpoint flares is -2.08 ± 0.19 .