

## Statistical study of X-Ray jets occurred in the polar region

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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 X-ray jets that occurred in the coronal hole. In order to reveal the properties of the polar X-ray jets in not only the coronal hole but also the quiet region, we detected 870 polar X-ray jets occurred around the north pole, and investigated the jets statistically. The 470 jets in the 848 events occurred in the coronal hole. The occurrence rate of the jets in the coronal hole and the quiet sun is  $5.04 \times 10^{-12}$  jets/hr/km<sup>2</sup> and  $7.66 \times 10^{-12}$  jets/hr/km<sup>2</sup>, 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  $2.91 \times 10^4$  km for the maximum length,  $4.42 \times 10^3$  km for the width, and 180 km/sec for the apparent velocity. The lifetime and length scale of the jets in this result is smaller than that in Savcheva et al. (2007). The reason for these differences 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 distributions of the parameters and found that the frequency distributions 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  $-4.22 \pm 0.36$ , and it is smaller than the index(-1.2) derived from the jets that occurred near the active regions(Shimojo et al. (1996)). The difference indicates that the occurrence rate of the polar X-ray jets with short lifetime is larger than that of the X-ray jets that occurred near active regions. On the other hand, the power-law index of the X-ray intensity of the footpoint flare is  $-2.04 \pm 0.27$ . The index is smaller than that of the X-ray jets near the active regions(Shimojo et al. 1996).

Keywords: X-ray jet, Solar, Polar region, Solar Flare, Magnetic Field, The Coronal Hole