# The solar active region No. 10486 and its production of high energetic flares at October-November 2003

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**Abstract.** The solar active region No. 10486 can be considered as one of the very large and powerful active regions since 1976. This region has produced the most important two solar flares during the period (1976-2003). The first flare released at 12:15UT on 28 October 2003 with importance X17/4B, and the second flare released at 22:25UT on 4 November 2003 with importance X28/3B. Both flares are the highest level in x-ray production since 1976, when different detectors, onboard various spacecrafts, have taken the data, and since 1996, when SOHO was launched to space. The first flare on 28 October 2003 produced protons events at 6:15UT on 29 Oct. 2003 with energies >10 MeV. The maximum solar wind speed is 1905 and 1986 km/sec at 29 and 30 October 2003 respectively. The same region after its rotation across the sun was appeared again on the sun's edge at 18 November 2003, and produced high energetic flare at 19 November 2003, which led to increase the solar wind speed to 947 km/sec at 20 November 2003. The evaluation of the active region No. 10486 is very important for understanding the high energetic proton flares. The aim of this study is to follow the morphological and magnetic changes of the active region before, during, and after the high energetic flares were produced. Also, applying the cumulative summation curves method for the different index of the active region to predict the flare of high energy has been carried out. The results are promising and can be used for proton flares and Geomagnetic storms prediction, few days before their occurrence.

## 1. Results and Discussions

The active region No 10486 were located at S17 L283 and passed through the solar disk from October 23 to November 4, 2003. This region has been rotated behind the western limb and out of view in Nov. 4 2003. It spent two weeks to traverse the far side of the Sun at 18 November 2003, and produced high energetic flare at 19 November 2003, which led to increase the solar wind speed to 947 km/sec at 20 November 2003. This region produced the most important two solar flares during the period (1976-2003). The first flare released at 12:15UT at 28 October 2003 with importance X17/4B, and the second flare released at 22:25UT at 4 November 2003 with importance X28/3B.more details give by Hong-Qi Zhang et al. (2004). The development of activity in region No. 10486, have been analyzed by the method of summation curves, for more details about method m see for example Reames et al. (1994). This method which shows the trend in the release of energy of active regions for energetic flares and X-ray bursts, and can be used to characterize typical intervals in the active region development, which often display the same trend of development over couple of days. This method can be used also as possible way of forecasting the occurrence of eruptive flares; one may expect flares few days before the occurrence of these flares.
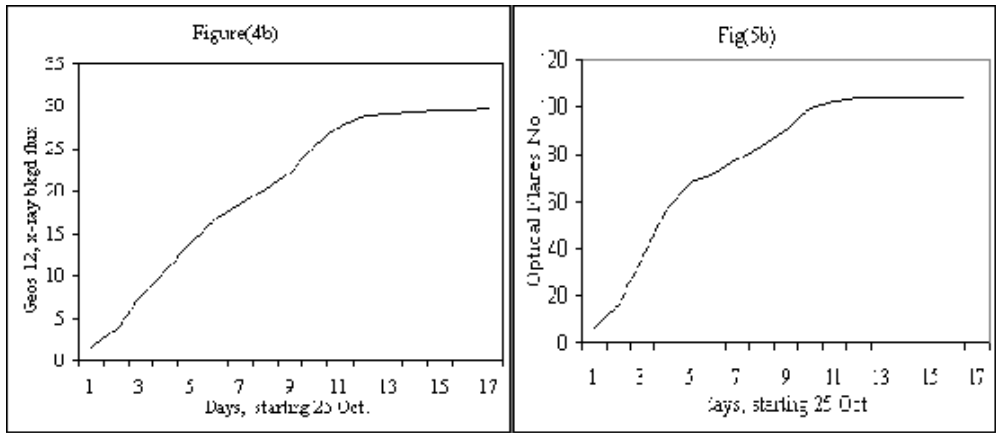
**Figure 1.** Daily cumulative Summation curve of x-rays Flares during 17 days starting 25 Oct.2003 to 10 Nov. 2003

Daily cumulative Summation curves of flare parameters, optical has been given in the Figure. A sudden increases optical flares and x-ray Background flux were appeared in figure (5b). The predictions by 2-3 days, before the occurrence of the eruptive flares have been given in this figure. For more details see A. Hady (2002).

## 2. Conclusions

The occurrence of very eruptive solar flares at the descending phase of the solar cycles becomes an observable phenomenon. As that observed in cycles numbers 20, 21, 22, and 23, and not depends on the level of activity of the cycle, where cycle 20, 23 are weak cycles, while cycles 21 and 22 are active cycles. The method of summation curve for predicting the eruptive flares by 2-3 days before the occurrence, by using X-ray background flux. And X-ray bursts flux. This prediction helps in a voiding the effects of eruptive flares on the space weather (Environments), on the earth's atmosphere, and on humankind activities.

## References

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