Kodaikanal Obs Bull (1988) 9, 223

POSSIBILITY OF OCCURRENCE OF SOLAR PROTON FLARES IN RELATION TO OTHER PHENOMENA

Wahab Uddin, M C Pande and V K Verma
Uttar Pradesh State Observatory
Manora Peak
Nainital 263 129, India

In the present investigation we have studied the relation between solar proton flares and as ociated optical, radio and X ray events It is found that optical flares are usually associated with large optical flares in H alpha ($\geq$ 2B) and long duration type II and IV, microwave and hard X ray bursts The results obtained in the present analy is may be u ed for the prediction of solar proton flare

During January 1976 May 1986 GOES satellite recorded 60 proton ($\geq$ 10 MeV) flare events Out of these 8 events were excluded from our analysis because no flares have been recorded in H alpha observations We found that 77% proton flares are associated with H alpha flares of importance class $\geq$ 2B We have calculated flare index (Kleczek 1952) for various proton flare producing active regions We found that proton flare start at that day when flare index is maximum in most of the active regions We have studied association between proton flares and various types of radio bursts It is found that about 70% type II, III and IV radio bursts are associated with proton flares Type I and V radio bursts show poor association (38% and 29%) with proton flares The duration of radio bursts is generally large, type I > 30 minutes, type II >10 minutes, type III & IV > 5 minutes type IV > 30 minutes The proton flares show 6?% association with the microwave bursts (range 0 9 2 0, 2 9 5 0 and 8 0 11 0 GHz The durations of proton flare associated microwave bursts are greater than 20 minutes We have found that 61% proton flares show association with hard X ray bursts (> 25 KeV) The duration of proton flares associated HXR bursts are > 6 min

The results obtained here may be used for the prediction of proton flares since H alpha flares, microwave, radio bursts and HXR bursts are observed much before (~8 hrs) the proton flares Therefore proton flares may be predicted upto 8 hrs before as observed by satellite

The detailed analysis of this work is under publication elsewhere

Reference

Kleczek J 1952 Bull Astron Inst Czech 3, 52