AN ANALYSIS OF THE RELATIONSHIP BETWEEN X-RAY AND H-ALPHA FLARES

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EXTENDET ABSTRACT. On the basis of observations obtained at the Debrecen Heliophysical Observatory in the H-alpha line-wings (± 0.5 Å and ± 1 Å from line center) i.e. in off-bands we have analysed the faint solare flare population. These observations were confronted with the standard H-alpha flare data and with the X-ray flare fluxes recorded on satellites GOES as given in Solar-Geophysical Data (SGD). The X-ray flux of each individual flare (in ranges 1 - 8 Å and 0.5 - 4 Å) have been used after the proped reduction of the background emission. The observational data were collected for the time from October 1979 to June 1981.

The flare observational data in H-alpha line wings were used to check wheter the collected sample of a bidimensional variable, characterizing X-ray flux in ranges 1 - 8 Å and 0.5 - 4 Å, displays the population unhomogeneity or not. We put the zero hypothesis that very faint X-ray flares are just small brightenings seen only in H-alpha line center. During the period of Debrecen observation, there were only four subflares recorded in SGD but observed in Debrecen only in the line center. (These four flares we could call simply as brightenings). Among the 232 flares observed in Debrecen in off-bands there were as much as 58 flares that we could not found in SGD. The obtained frequency distribution of the variables characterizing flare X-ray fluxes shows that a considerable part of the flares not recorded in SGD reveals higher values of X-ray flux in range 0.5 - 4 Å. The number distribution of the bidimensional variable characterizing flare X-ray fluxes enable us to distinguish two populations: one of them (38 % of total amount) contains flares with very weak X-ray flux, and the second one the flares with the strongest fluxes. Such a great amount of very faint X-ray flares revealing simultaneously the H-alpha line brightenings forces the rejection of our above adopted zero hypothesis.

We investigated, additionally, the set of 68 flares with very weak X-ray flux in the range 1 - 8 Å that show at the same time strongly increased 0.5 - 4 Å flux, too. The question is whether these flares represent the precursors of strong X-ray flares or not. We found that after 49 flares a very strong flare activity were observed indeed. In order to look in more details whether these 49 weak flares are really precursors of the more stronger ones, we made a search over the Debrecen observational data. Among these 49 events in 14 cases the strong flare followed a weak one. The location of these 14 pairs of flares have been checked. We found the flares occurred almost at the same place in 8 and near-by in 3 cases. Only in 3 other cases we could not find any relation among these flare locations.

Our result will be published in more details elsewhere.