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Acceleration and Transport of Energetic Particles in the Heliosphere and Beyond (D1.6)

STATISTICAL ANALYSIS OF THE HOT ONSETS OF SOLAR FLARES DETECTED IN SOFT X-RAYS

Douglas Silva, douglas93f@gmail.com
Universidade Presbiteriana Mackenzie/CRAAM, São Paulo, Brazil
Paulo Simões, paulo.simoes@glasgow.ac.uk
SUPA - School of Physics and Astronomy, U. Glasgow, Glasgow, United Kingdom
Hui Li, hli@spaceweather.ac.cn
National Space Science Center, Chinese Academy of Sciences, Beijing, China: Chinese Academy of Sciences (CAS)
Joaquim Costa, joaquim.costa@inpe.br
National Institute for Space Research (INPE), Sao Jose Dos Campos, Brazil
Adriana Valio, adrivalio@gmail.com
Universidade Presbiteriana Mackenzie/CRAAM, Sao Paulo, Brazil

Solar flare radiation, energetic particles, and associated coronal mass ejections drive the Space Weather near Earth. To help forecast Space Weather and mitigate its effects on our technological infrastructure, understanding the physical processes that trigger solar flares is a dire need. We present the investigation of solar flares that occurred between 2011 and 2012 of a recently identified, and yet to be understood, phenomena in solar flares: the presence of hot (10–15 MK), low-lying and compact sources at the onset of these events. A statistical analysis of the onset of solar flares is performed using the temperature and emission measure estimated from the soft x-ray data. The flare sample used in this study has been extracted from the GOES event list. For the statistical study of the hot onset, we manually subtracted the pre-flare background X-ray flux. A total of 749 events with location information were investigated. About 564 ($\sim$ 75%) of these had temperatures greater than 10 MK at the very beginning, which were dubbed “hot onset" sources. The results show two types of behavior with respect to temperature and emission measure at the beginning of the events. In the first one, the temperature is high since the beginning of the event, whereas the emission measure presents a low value. As for the other behavior, during the beginning of the event an immediate and progressive increase in temperature is see, while the emission measure rapidly decreases. Also, when the temperature reaches a peak, the emission measure reaches the valley.