

Response to F. Di Mare (Referee) comments on “A correlation study regarding the AE index and ACE solar wind data for Alfvénic intervals using wavelet decomposition and reconstruction” by Fernando L. Guarnieri et al.

F. Di Mare (Referee)

The paper deals with the description of a model able to calculate a time series named AE*, by a filtering process based on the Meyer's wavelet decomposition and reconstruction technique. This methodology is applied to the interplanetary magnetic field (IMF) data, taken by the orbiting ACE spacecraft at the L1 Lagrange point. To be more precise, the authors focus their attention on the magnetic reconnection mechanism associated with Bz component of the magnetic field directed southward, considered to be the main mechanism for the efficient transfer of energy into the magnetosphere.

Thus, the wavelet decomposition techniques is applied in both the AE indices and the IMF Bz components for a set of 14 geoeffective interplanetary high speed solar wind streams (HSS) events. These intervals exhibit Alfvénicity verified through the technique employed by Belcher and Davis (1971). The AE* indices obtained, have been after compared with the real auroral electrojets (AE) indices using cross-correlation analysis. The significant results show a very strong correlation ~ 0.9 , allowing to confirm that the model works well. The other purpose is to highlight the importance of having predictions of the occurrence of relativistic electrons during periods with Alfvénic fluctuations in the IMF. This is because of the intense AE activity events called HILDCAAs (Tsurutani and Gonzalez, 1987) have been shown to be indirectly related to the production of relativistic electrons in the Earth's magnetosphere (Hajra et al., 2014, 2015a, 2015b). In these respects, the paper is very interesting since is able to predict the occurrence of relativistic electrons, giving advanced notice by more than a day. Furthermore it provides future implementations with data from other spacecraft located in L1 Lagrange point.

The presentation is clear and concise, but the authors may better explain the meaning of the AE index since they use the latter to study a correlation between the real AE index and the calculated AE for each events of ACE solar wind data described.

Response: First of all, we would like to thank the referee for the constructive comments. The other anonymous referee also mentioned a lack of explanation on the AE index. We have now included a paragraph in the revised manuscript to address this point.

In order to use the events of HSS is recommended to mention also how the data are associated to elevated AE intervals, adding more details about the relation between the auroral activity and the Bz component of the magnetic field.

Response: Yes, done. We have also included some more references.

The procedure used for the decomposition/reconstruction of the signal and the empirical model is well explain and the text is fluent. Figures and tables have an appropriate quality, nevertheless the authors may avoid inserting figure 4, which has no particular graphical information, but its meaning is well explained in the text (lines 6-13 page 6).

Response: Thanks for the comments and suggestion. Concerning Figure 4, we prefer to keep it since it is complementary to the discussion on page 6, around lines 24-35.

In light of these comments, the paper is interesting, the subject is attractive for the future developments with other datasets, and, if the above suggestions will be taken into account, the manuscript is ready to be published..