Geophysical Research Abstracts
Vol. 19, EGU2017-14567, 2017
EGU General Assembly 2017

JOINT Ne/O AND Fe/O ANALYSIS TO DIAGNOSE LARGE SOLAR ENERGETIC PARTICLE EVENTS DURING SOLAR CYCLE 23

Olga Malandraki (1), Lun C. Tan (1,2), and Xi Shao (2)

(1) IAASARS, National Observatory of Athens, GR-15236, Penteli, Greece omaland@astro.noa.gr, Athens, Greece (omaland@astro.noa.gr), (2) Department of Astronomy, University of Maryland, College Park, MD 20742, USA

In this work we have examined 29 large SEP events with the peak proton intensity Jpp(>60MeV) >1 pfu during the solar cycle 23. The emphasis of our examination is put on a joint analysis of the Ne/O and Fe/O data in the 3-40 MeV/nucleon energy range as covered by the Wind/LEMT and ACE/SIS sensors in order to differentiate between the Fe-poor and Fe-rich events emerged from the CME-driven shock acceleration process. Some of our main findings are: (1) An improved ion ratio calculation can be carried out by re-binning ion intensity data into the form of equal bin widths in the logarithmic energy scale, (2) through the analysis we find that the variability of Ne/O and Fe/O ratios can be used to investigate the accelerating shock properties, (3) in particular, we observe a good correlation of the high-energy Ne/O ratio with the source plasma temperature T recently reported by Reames (2016). Therefore, the (Ne/O)n value at high energies should be a proxy of the injection energy in the shock acceleration process, and hence the shock θBn according to the models of Tylka & Lee (2006) as well as Schwadron et al. (2015).
Acknowledgements. We gratefully acknowledge the source plasma temperature data provided by D. Reames, Wind/EPACT/LEMT data provided by the NASA/Space Physics Data Facility (SPDF)/CDAWeb, and the ACE/SIS data provided by the ACE Science Center. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 637324.