

Project Details

ROSES ID: NRA-NNH04ZSS001N

Selection Year: 2005

Program Element: Data, Tools, & Methods

Topic: To determine the mechanisms responsible for the formation and loss of new radiation belts in the slot region in response to geo-effective solar wind structures.

Project Title:

Next Generation Specification of the Earth's Radiation Environment

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Project Member(s):

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Summary:

We propose to develop a next generation comprehensive electron radiation belt specification model to supersede existing models like AE-8. The 2003 Science Definition Team report identifies this next generation specification as a top priority because the existing models are out of date, leading to incorrect and incomplete specifications. Incorrect specifications lead to a host of problems, including incorrect spacecraft design choices. Incomplete specifications limit the technical and scientific applications of the specification model. The primary objective of this upgrade will be to improve the quality of the outputs of the models by incorporating the enormous volume of radiation measurements obtained since the release of the current specifications. Additionally, we will enhance the capabilities of the model to: (1) provide 6-month resolution in solar cycle phase because the existing solar max/solar min delineation badly misrepresents the solar cycle variation of the radiation belts; (2) provide the ability to put error bars on the estimated mission dose and internal charging specifications through the provision of percentiles as well as mean fluxes--these error bars will curtail the multiple arbitrary fudge factors commonly added to the outputs of the specification models; (3) provide a specification of ring current ions (H⁺, O⁺, He⁺, He⁺⁺ from 1 to 400 keV), which are not part of the existing specification models because such ions have only recently been recognized as a possible radiation hazard (e.g. solar array cover-glass darkening); (4) provide covariance matrices among the fiducial fluxes in the specification so that the specification can be used as an a priori model for data assimilation of in situ flux measurements and solar-wind driven forecasts and for inversion of ENA images. We will include data from a variety of sources in our next generation specification model, including Polar, SAMPEX, CRRES, SCATHA, GOES, POES, LANL GEO, LANL GPS, Cluster, and ISEE.

Publication References:

Summary: no summary

Reference:

Mann, I. R.; Balmain, K. G.; Blake, J. B.; Boteler, D.; Bourdarie, S.; Clemmons, J. H.; Dent, Z. C.; Degeling, A. W.; Fedosejeves, R.; Fennell, J. F.; Fraser, B. J.; Green, J. C.; Jordanova, V. K.; Kale, A.; Kistler, L. M.; Knudsen, D. J.; Lessard, M. R.; Loto'aniu, T. M.; Milling, D. K.; O'Brien, T. P.; Onsager, T. G.; Ozeke, L. G.; Rae, I. J.; Rankin, R.; Reeves, G. D.; Ridley, A. J.; Sofko, G. J.; Summers, D.; Thomson, I.; Thorne, R. M.; Tsui, Y. Y.; Unick, C.; Vassiliadis, D.; Wygant, J. R.; Yau, A. W.; (2006), Advances in Space Research, Volume 38, Issue 8, p. 1838-1860, doi: 10.1016/j.asr.2005.11.009

Summary: no summary

Reference:

Mann, I. R.; Beaudette, S.; Ozeke, L. G.; Loto'Aniu, T. M.; Dent, Z. C.; Harrison, P.; Thibault, J.-F.; McCabe, D.; Wehrle, V.; Fedosejevs, R.; Knudsen, D.; Milling, D. K.; Yau, A. W.; Balmain, K.; Baker, D. N.; Blake, B.; Fennell, J.; Kistler, L.; Li, X.; O'Brien, T. P.; Wygant, J.; (2009), The Outer Radiation Belt Injection, Transport, Acceleration and Loss Satellite (ORBITALS): A Proposed Canadian Small Satellite Mission for ILWS, FUTURE PERSPECTIVES OF SPACE PLASMA AND PARTICLE INSTRUMENTATION AND INTERNATIONAL COLLABORATIONS: Proceedings of the International Conference. AIP Conference Proceedings, Volume 1144, pp. 146-156, doi: 10.1063/1.3169279

