

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Environmental Effects and Spacecraft Protection (6)

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THE SARG METHODOLOGY: UPGRADING SOLAR ENERGETIC PARTICLE EVENT TIME
DISTRIBUTIONS AND MODELLING METHODS

Abstract

Solar Energetic Particles (SEPs) can result in effects on spacecraft including displacement damage and single event effects. As such, modelling the SEP environment to be able to derive the likely extent of these effects is important for efficient design of future spacecraft. The SARG (Southampton Astronautical Research Group) solar proton methodology can be applied to data for predicting the worst-case peak flux, worstcase event fluence and cumulative mission fluences for various time periods at different confidence level across a range of energies from 5 - 200 MeV. This includes data processing tools for 'cleaning' SEP flux data prior to the extraction of Solar Energetic Particle Events (SEPEs) from the time series. There is a review of the time distributions applied to SEPEs and Poissonian assumptions of existing models with the finding that the SEP environment appears to be less constant in time with more variation with a greater level of 'memory' in the process indicating that the events are less random than was previously thought. The new modelling methodology incorporates SEPE durations to create realistic timelines for modelling the environment. finally there is a comparison of results using the SARG methodology and other well-known methods for producing solar proton models at 1 AU namely the JPL and ESP methods.