

# Long and short-term fluences of solar energetic particles from H to Fe

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We use data from ACE and GOES to investigate the probability of experiencing solar energetic particle (SEP) fluences of various sizes. For heavy ions, measurements with the SIS instrument on ACE were used to measure the probability distribution of O and Fe fluences with  $>10$  and  $>30$  MeV/nucleon over a range of time scales. The results can be represented as log-normal distributions over an intensity range of several decades. For protons and He, data from NOAA's GOES satellites were used to measure the probability distribution of SEP fluences on time scales ranging from 1 hour to 3 years. These data sets have been combined to investigate probability distributions for He/H, O/He and Fe/H. The results of this study can be used to estimate SEP radiation hazards for space missions of various time durations.