Juan
Rodriguez
University of Colorado CIRES
Fadil Inceoglu, University of Colorado CIRES
Brian Kress, University of Colorado CIRES
Poster
Proton fluxes of 10's-to-100's of keV observed by solid state telescopes have been observed to decrease gradually with time. This decrease has been attributed to radiation damage by the protons being detected. As the resulting dead layer grows, protons deposit less energy in the active part of the detector, and higher energies are required to meet the detected energy thresholds. The channel effective energies drift upward, and thus the observed fluxes decrease. Past correction methods have used comparisons between recently-launched and older instruments, but observed differences can have more than one cause. Energy-dependent periodicities of drift echoes in geostationary orbit provide a measure of channel energies. We have developed an automatic method for detecting and characterizing drift echoes that can be applied to multiple years of satellite data and thereby track any change in channel energies. We identified drift echo candidates by applying CLEAN to high-pass-filtered flux time series in overlapping sliding windows sized to the expected proton and electron drift periods at geostationary orbit. Within each window, statistically significant oscillation frequencies were isolated iteratively using FFT peak detection, sinusoidal fitting and subtraction, and Monte Carlo testing relative to a residual-based lag-1 autoregressive red-noise model. Application of this method to over eight years of GOES-16 proton and electron fluxes confirms that proton channel energies increased with time while electron channel energies were stable. The collected drift echo detections have been used to study the behavior of drift echoes at all local times in response to solar wind drivers.
Poster session day
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Poster location
24
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