



ELFIN observations of relativistic electron scattering

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The Electron Loss and Fields Investigation is two identical polar-orbiting 3U+ CubeSats designed to explore the mechanisms responsible for relativistic electron loss during magnetic storms. Pitch-angle resolved energy spectra of electrons between 50-5000keV are routinely measured. Data collected during 3 storms satisfy minimum mission requirements. Energy and pitch-angle spectrograms for a post-noon electron precipitation event, lasting several minutes, extending over L-shells from 8 to 4 is shown in the left Figure 1, Left Column, below. Precipitation (4th panel down) is observed at energies up to hundreds of keV. At one instance it peaks at 350keV and extends to ~2MeV. Figure 1, Right Column, shows wave observations from ancillary equatorial spacecraft and the THEMIS ground based observatories, favorably situated at the post-noon sector. Chorus, EMIC waves and kinetic Alfvén waves were observed in space, all contributing to the electron scattering. Comparison of the wave frequency, k-vector and resonant energy with the precipitation pitch-angle and energy spectrum at ELFIN is expected to produce direct evidence for the scattering process at play.

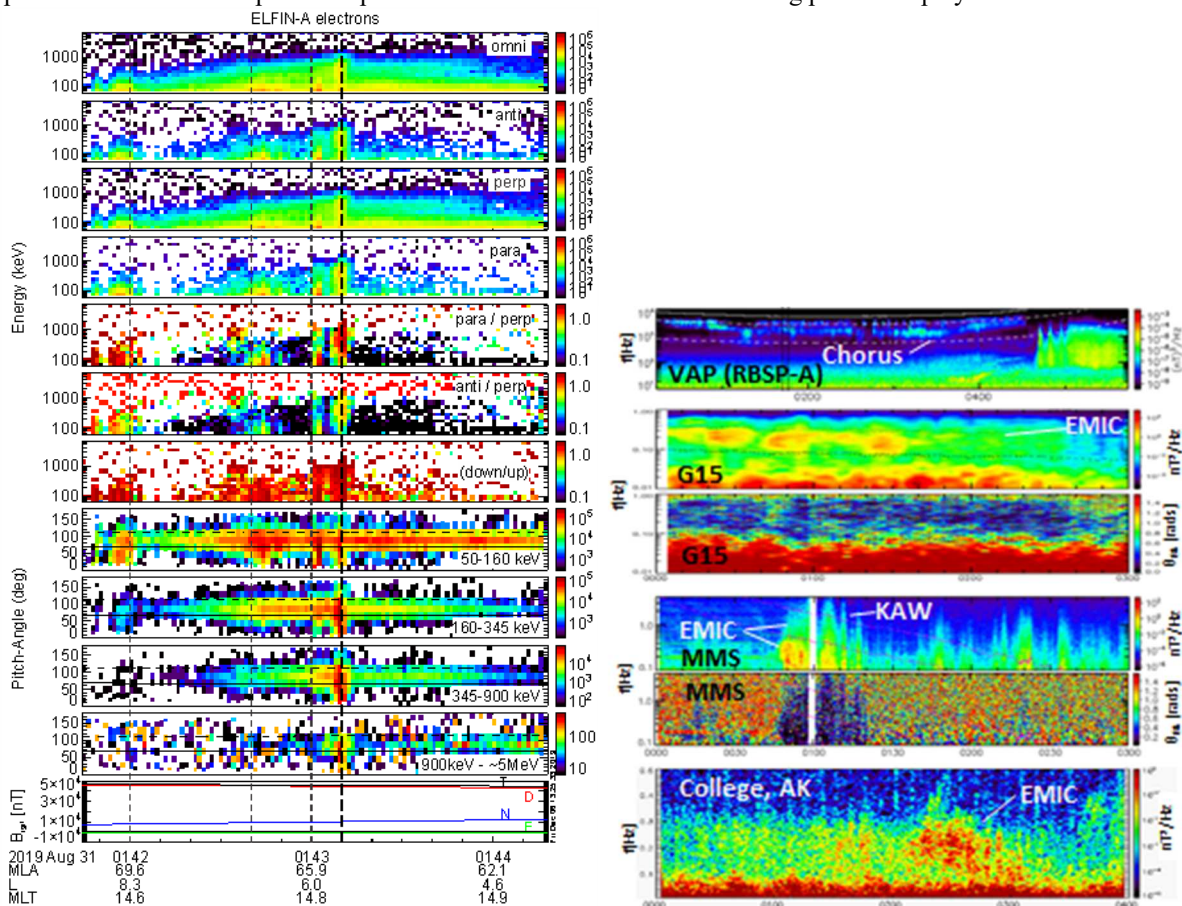


Figure 1. Left column: EPDE data from ELFIN-A during a post-noon crossing. Top 4 panels: energy-time spectrograms of number fluxes; next 3 panels: energy-time spectrograms of flux ratios in directions shown in inserts; next 4 panels: pitch-angle versus time spectrograms of number fluxes in integral channels denoted in the inserts. Bottom: IGRF-field used for local pitch-angles in angle spectrograms (loss cone: solid line; anti-loss cone: dashed line in spectrograms). Right column: Equatorial observations of waves from the missions indicated, which were in conjunction with ELFIN.