<u>The Miniature X-ray Solar Spectrometer (MinXSS) CubeSat</u>

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Solar extreme ultraviolet (EUV) and soft X-ray (SXR) emission is the primary driver of upper atmospheric dynamics in Earth's ionosphere, thermosphere, and mesosphere (ITM). The 1-5 nm wavelength range is particularly important, as it is thought to contain the greatest enhancement in radiated energy during solar flares. These wavelengths are preferentially absorbed in the D- and E-regions of the ionosphere, including the mesopause; because of the steep cross-section for photoionization, due primarily to the K-edges of atomic N and O, the specific altitude where energy absorption is concentrated depends strongly on wavelength, and hence the resulting solar-driven dynamics are critically dependent on the spectral energy distribution within this wavelength band. While there is a long history of broadband, spectrally-integrated measurements of the total radiated energy within this spectral range, there have been very few spectrally-resolved observations that could provide insight into the wavelength distribution of that energy. Consequently, it has proven difficult to reconcile observed ionospheric dynamics with those predicted using broadband observations.

The Miniature X-ray Solar Spectrometer (MinXSS), a 3U CubeSat funded under NASA's Heliophysics Technology and Instrument Development for Science (H-TIDeS) program, will directly address these issues. Using a new SXR spectrometer incorporating a cooled silicon drift detector (SDD) design, MinXSS will observe solar SXR emission ~0.5 to ~30 keV (~0.04-2.4 nm) with ~0.15 keV FWHM resolution (~0.5 nm FWHM @ 2.4 nm, ~0.5 pm FWHM @ 0.04 nm), thus providing direct measurements of the solar spectral irradiance over a significant fraction of the poorly-observed 1-5 nm range. MinXSS is currently in Phase C, with integration expected to be completed in Fall 2014 and delivery in Feb 2015, for deployment from the International Space Station in April 2015. The ~7-12 month expected mission life will allow MinXSS to sample a wide variety of solar activity, including quiet, active, and flaring. With its excellent spectral resolution, MinXSS will provide crucial insight into the spectral energy distribution in the solar SXR emission that will improve our understanding of both solar variability in the SXRs and the resulting effects of that emission on Earth's upper atmosphere and ionosphere.