Thomas J.
Immel
Univ of California, Berkeley
B. J. Harding, Univ of California, Berkeley
S. B. Mende, Univ of California, Berkeley
K. A. Rider, Univ of California, Berkeley
J. B. McPhate, Univ of California, Berkeley
M. W. Liemohn, Univ of Michigan
A. J. Ridley, Univ of Michigan
Poster
The Spectrographic Ultraviolet Imager is an innovative, dual-wavelength, 2D imaging design that has been used for a range of critical measurements on NASA missions. Its utility has been proven on NASA IMAGE and NASA ICON with a combined 8 years of on-orbit observations. Both CCD cameras and cross-delay line event-counting detector systems have been used successfully. Optical gratings and coatings from a range of different vendors have been implemented. The systems are low noise, with photon traps and field masks throughout each implementation, yielding a system that reduces out-of-field stray light and in-field contaminating emissions by factors of 10^4 to 10^6. The dual band system implemented for previous missions is adapted to the purpose of the MAAX mission to retrieve FUV images of the auroral N_2 band emissions at 144 nm and 173 nm, the ratio of which is directly related to the altitude profile of the emissions and the auroral ionospheric conductivity. The recent Phase A study for the NASA MAAX mission concept yielded new performance metrics for the retrieval of auroral conductances, and the sensitivity of the retrieval to many adverse factors. This historically known sensitivity of the retrieval to a contaminating line emission of atomic nitrogen (at 149 nm) is addressed, showing the actual insensitivity of the retrieval to this auroral feature. For diffuse aurora, we show the retrieval is insensitive to view angle. These attributes provide the two MAAX observatories key capability from their vantage point of a 6 R_E altitude circular polar orbit. With continuous imaging of the terrestrial aurorae with better than 50 km resolution, MAAX provides new capability for space weather research and operations. Here we also discuss additional capability that comes with mounting the grating on a rotatable stage. This provides access to emission lines of atomic oxygen, with application for broader thermospheric and ionospheric measurement objectives. Specifically, the precise determination of thermospheric composition ratios and nighttime ionospheric densities become easy targets for a MAAX-type instrument with a movable grating.

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