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Prelaunch characterization of spectral response function for better calibration and validation of Geostationary Environment Monitoring Spectrometer (GEMS)

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The next generation of geostationary earth observing satellite program of Korea (GK 2A and 2B) have been developed. The GK-2B is dedicated for the ocean and environmental mission with planned launch of 2019. For the environmental monitoring mission, a hyperspectral spectrometer named the Geostationary Environment Monitoring Spectrometer (GEMS) designed to monitor the important trace gases such as O_3, SO_2, NO_2, HCHO and aerosols which affect directly and indirectly the air quality will be onboard with an ocean color imager. As part of important ground-calibration activities for GEMS instrument, we characterize and derive the ground-measured spectral response function (SRF) in the spectral domain. A series of analytic model functions such as pre-flight OMI function, hybrid Gaussian and Super Gaussian functions proposed from the previous studies are parametrized from the nonlinear-least-squared, Levenberg-Marqurdt algorithm. Minimum chi-squared values obtained from algorithm make it possible to determine the most proper analytic GEMS SRFs. While, the characterization and derivation of ground measured SRFs has been carefully investigated, there is always possibility of significant changes in effective SRFs in space. Thus, accurately characterizing of the on-orbit SRFs is highly important in wavelength calibration and retrieval algorithm of trace gases given that the calibration algorithm is most sensitive due to the uncertainty of SRF function. Here we present the algorithm to estimate the on-orbit GEMS SRF by utilizing a simulated GEMS irradiances and high-resolution solar reference spectra.