



On-orbit polarization correction of GEMS

Haklim Choi (1), Kwang-Mog Lee (1), Ukkyo Jeong (2), Xiong Liu (3), Heesung Chong (4), Jhoon Kim (4), and Kelly Chance (3)

(1) Kyungpook National University, Korea, Republic Of (haklim84@knu.ac.kr), (2) Kyungpook National University, Korea, Republic Of (kmlee@knu.ac.kr), (3) NASA Goddard Flight Space Center, Korea, Republic Of (ukkyo.jeong@nasa.gov), (4) Harvard University, United States (xliu@cfa.harvard.edu), (5) Yonsei University, Korea, Republic Of (hesungc@knu.ac.kr), (6) Yonsei University, Korea, Republic Of (kim.jhoon.b@gmail.com), (7) Harvard University, United States (kchance@cfa.harvard.edu)

The purpose of this presentation is to describe the GEMS (Geostationary Environmental Monitoring Spectrometer) polarization correction algorithm. The mission of GEMS is to monitor atmospheric pollutants such as O₃, SO₂, NO₂, HCHO and to monitor atmospheric aerosols.

To retrieve the aforementioned pollutants, the accurate measurement of reflected radiance is of importance. There are various sources of errors in the measured radiance spectrum. One of them is the polarization of light reaching the instrument onboard the spacecraft. The polarization could affect the magnitude of measured radiance.

The solar radiance is un-polarized light before it reaches to the earth-system. As it passes through the atmosphere, sunlight becomes strongly polarized. The radiometric response at the CCD (Charge Coupled Device) can be affected by polarization state of the incoming light due to mirrors and grating and so on. Unfortunately, GEMS does not have a sensor that observes polarization states of atmosphere like PMD (Polarization Measurement Device). Therefore, we adopted polarization characterization method that measures the instrument polarization sensitivity and atmospheric polarization based on simulated results from radiative transfer model.

In this study, we developed the polarization correction algorithm and analyze the polarization characteristics of the light measured at the top of atmosphere and verify the polarization correction algorithm using the synthetic data for GEMS measurement domain.