traced, as they have entered into the GOCI aperture. As they pass through each GOCI optical part, the ray path and intensity are adjusted according to the measured characteristics for reflection, transmission, refractive index and surface scattering. The ray-traced imaging and radiative transfer performance indicators confirm that the computer generated GOCI optical system with measured characteristics can be used for in-orbit operation simulation following the designed measurement sequence. The computational technique and its implications as a operation support tool are discussed.

[III-2-4] Current progress in development of full 3D earth model for integrated ray tracing simulation of planetary disk averaged spectra

Dongok Ryu[1] , Kiljae Jung[1], Eun-song Oh[1], Ki-Beom Ahn[1], Soomin Jeong[1], Yukyeong Jeong[1], Jinhee Yu[1], Jae-Min Lee[1], Eric(JS) Hong[2], and Sug-Whan Kim[1]

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Detection of spectral bio-signatures from extra terrestrial planets has received an increasing attention from the astronomy and space science communities in recent years. In an attempt to better-understand disk averaged spectra of the only know terrestrial planet i.e. Earth, we are constructing a scale-able 3D earth model with surface reflectance and scattering properties. The USGS coastal line data were used to form coastal line segments and they were then stitched to generate continuous coastal lines to represent major continents and large islands. As the first stage of model verification, wavelength dependent ocean and land reflectance data and scattering characteristics were defined over the land and sea surfaces respectively. We then performed ray tracing based imaging and radiometric transfer simulations using a hypothetical optical payload receiving the reflected and scattered sun lights from the earth. The model concept, computational details, the simulation results are discussed as well as the future development plan.

■ Session IV-2 : Satellites 1
Wednesday, 22 October [17:40-18:40]

[IV-2-1] Star Visibility Analysis for a Low Earth Orbit Satellite

Jo Ryeong Yim, Seon-Ho Lee, and Ki-Lyuk Yong

Department of Satellite Control System, Korea Aerospace Research Institute

Recently, star sensors have been successfully used as main attitude sensors for attitude control in many satellites. This research presents the star visibility analysis for star trackers and the goal of this analysis is to make sure that the star tracker implementation is suitable to the mission profile and scenario and satisfies the requirement of attitude orbit control system. As a main optical attitude sensor imaging stars, accomodations of a star tracker should be optimized in order to improve the probability of the usage by avoiding the blinding (the unavailability) by the Sun and the Earth. For the analysis, a statistical approach and a time simulation approach are used. The statistical approach is based on the generation of numerous cases, to derive relevant statistics about Earth and Sun proximity probabilites for different lines of sight. The time simulation approach is performed for one orbit to check the statistical result and to refine the statistical result and accomodations of star trackers. In order to perform simulations first of all, an orbit and specific mission profiles of a satellite are set, next the earth proximity probability and the sun proximity probability are calculated by considering the attitude maneuvers and the geometry of the orbit, and then finally the unavailability positions are estimated. As a result, the optimized accomodations of two star trackers are suggested for the low earth orbit satellite.

[IV-2-2] Contamination Control of Optical Observation Satellite

Chang-Ho Lee, Choon-Woo Lee, Young-Jun Cho, and Do-Soon Whang

Korea Aerospace Research Institute

Contamination has the potential for degrading the performance of the optical payload beyond the limits defined by mission requirements, therefore it must be considered a risk to system performance and must be mitigated. To mitigate contamination problem, contamination budget is allocated according to the contamination requirements which is derived from contamination effect analysis. Once the contamination budget is allocated, prediction for on-ground and in-orbit contaminants amounts and cleanliness control is performed. In this article, typical contamination control for observation satellite is described.

[IV-2-3] Satellite FEM Validation test for High Frequency Jitter Analysis

Shi-Hwan Oh and Ki-Lyuk Yong

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The aim of the test is to provide an experimental basis to