R005-P05
ポスター３：11/25　PM1/PM2 （13:15-18:15）

高緯度帯観測に特化した夜光雲観測カメラの開発ーキルナでの試験観測結果報告

#遠藤 哲歩 1), 川上 莉奈 1), 増田 歩音 1), Peter Dalin2), 津田 卓雄 3), 鈴木 秀彦 1)
(1 明治大, (2The Swedish Institute of Space physics, (3 電通大

Development of NLC Imager for observation in the high latitude region. -The test observation in Kiruna, Sweden

#Akiho Endo1), Rina Kawakami1), Ayune Masuda1), Dalin Peter2), Takuo Tsuda3), Hidehiko Suzuki1)
(1Meiji university, (2The Swedish Institute of Space physics, (3University of Electro-Communications

Noctilucent cloud (NLC) images often contain fine wavy structures ranging from several kilometers to several tens of kilometers. These are thought to reflect local small-scale atmospheric disturbances in the upper mesosphere. Satellite imaging data cannot resolve these fine structures, and thus, ground-based imaging of the NLC is the effective method to study the small-scale disturbances in the upper mesosphere.

NLCs are mainly observed by satellite (e.g. AIM satellite) in the high latitude regions. However, this area is under the influence of the midnight sun, which makes it difficult to detect NLCs from the ground because of the bright background sky condition. Therefore, opportunities for NLC observations from ground in the high latitude regions are limited. On the other hand, there is an opportunity for NLC observation during the period of decline for NLC occurrence even in the high latitude region. In addition, slow variation in the solar elevation angle enables continuous observation of NLCs with similar geometric conditions throughout the night. Thus, there is evident merit in studying the NLC morphology if the opportunity for NLC observation increases in the high-latitude regions.

We have examined the feasibility to overcome this “bright background problem” by developing an optical imager specialized for noctilucent cloud observations [Nakamura et al.,2021]. Noctilucent clouds are known to have a spectral peak at 400-500 nm in their radiance [Lange et al.,2022]. On the other hand, the background spectrum in twilight sky attenuates in wavelengths shorter than 680nm. Therefore, there should be the optimum wavelength band for noctilucent cloud observation which gives a better signal-to-noise ratio (SNR) in shorter wavelength regions. In this study, the most suitable bandpass for NLC observations is proposed based on the ground spectra of the twilight background sky obtained in the polar region. We proposed that an imaging observation by using a cooled CMOS camera equipped with the bandpass filter which has the center wavelength at 371 nm and 40nm bandwidth can give effective SNR (SNR>1.80) for NLC even under a bright sky condition which corresponds to a local solar zenith angle ~91°.

We carried out the test observation of the developed imager in Kiruna, Sweden (N 67.8, E20.4) in August, 2024. As a result, we succeeded in capturing the NLC with the NLC imager, the digital camera and the small spectrometer between 23:00 on 19 August and 1:00 on 20 August (LST). We present the prompt result of this test observation and discuss the performance of the new camera.