P-10

Investigation of the feasibility of generating the green channel from GK2A using Pix2Pix method for GK5 channel selection

Jinyoung Kim and Eunha Sohn

National Meteorological Satellite Center, KMA

National Meteorological Satellite Center (NMSC) of Korea Meteorological Administration (KMA) is currently preparing for the development of GEO-KOMPSAT-5 (GK5) as a successor satellite to GEO-KOMPSAT-2A (GK2A). GK5 is planned to be equipped with a high-performance weather sensor consisting of 18 channels, which includes 16 channels from the existing GK2A Advanced Meteorological Imager (AMI) sensor and 2 additional channels for low-level water vapor detection.

In contrast to the AMI sensor, which uses the green channel, the Advanced Baseline Imager (ABI) sensor on the Geostationary Operational Environmental Satellites-R (GOES-R) series has chosen a 2.25μm channel, which useful for cloud particle size retrieval. To generate the green component for true-color RGB imagery in the GOES-R series, a lookup table taken from Himawari-8 observations is employed. If it were possible to exclude the green channel during the channel selection process for GK5, it would be advantageous to choose other useful channel such as the 2.25μm channel, similar to the ABI sensor.

This study investigates the feasibility of generating the green channel for the AMI sensor using the Pix2Pix method, based on a conditional generative adversarial network (cGAN). We used reflectance data from AMI's visible

0.47μm, 0.64μm channels and the vegetation channel at 0.86μm as input data, and generated the 0.51μm channel as output. The input and output data were chosen with a 1km resolution in the East Asia region. Due to the nature of visible channels being observable only during daylight, we selected 04 UTC corresponding to daytime and mixed day-night times at 01 and 09 UTC. Consequently, we added solar zenith angle to the model input channels. Since the 0.51μm channel is useful for detecting small particles, we conducted spatiotemporal analysis for dust events. Upon validating the generated and observed images, we obtained results with a bias of ±0.3% and root mean square error (RMSE) of 0.8% for reflectance. The generated green channel closely resembles observations, suggesting the feasibility of excluding this channel. This research can contribute to more effectively studying and predicting various weather phenomena by replacing another channel to GK5.

This work was funded by the Korea Meteorological Administration's Research and Development Program "Technical Development on Weather Forecast Support and Convergence Service using Meteorological Satellites" under Grant (KMA2020-00120).