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Visible Bands Simulation of Advanced Meteorological Imager onboard GEO-KOMPSAT-2A Using Its Infrared Bands

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RGB true-color images derived from visible (VIS) satellite bands provide crucial information about atmospheric and surface conditions, facilitating intuitive comprehension and visualization. This study presents a data-to-data (D2D) translation method based on a combination of a conditional generative adversarial network (CGAN) and data normalization. The aim is to generate virtual daytime and nighttime RGB images using data from the advanced meteorological imager (AMI) sensor aboard the GEO-KOMPSAT-2A (GK-2A) satellite.

The D2D model was trained using the pre- and post-processed data, including the AMI sensor's brightness temperature (BT) and albedo, specifically, the datasets of the BT at AMI infrared (IR) bands, BT differences between the two AMI IR bands, and the albedo at the AMI's three visible bands. During the daytime, the D2D model showed excellent performance compared to observed AMI visible bands, achieving high correlation coefficients (CC) of 0.941, 0.939, and 0.917 for the blue, green, and red bands and low root mean square errors (RMSE) of 0.047, 0.050, and 0.061 for albedo in three VIS bands. The trained D2D model generates the virtual AMI VIS bands using AMI IR bands for nighttime, similar to daytime. However, the D2D model displayed limitations in simulating desert areas with high-temperature contrast during both day and night. Nevertheless, this study demonstrates the benefits of state-of-the-art deep-learning

techniques for global meteorological monitoring and understanding. Thus, the Korea Meteorological Administration provides an official service for D2D-simulated RGB products in the East Asian region. The study details on the D2D method and its results will be provided in the upcoming presentation.