**Comparison of Gap-filling algorithms of Sentinel-2A/B NDVI images**

**for monitoring in rice paddy fields**

Jeong Eun1, Sun-Hwa Kim2\*, Tae Ho Kim3

1 Principal Researcher, Corporate Research Institute, PerPixel Inc., Republic of Korea

2 CEO, PerPixel Inc., Republic of Korea

3 Director, Underwater Survey Technology 21 Corp., Republic of Korea

[\*sunhk@perpixel.co.kr](mailto:*sunhk@perpixel.co.kr)

***ABSTRACT***

CAS500-4(agricultural and forestry satellite) scheduled for launch in 2025, is designed for wide-area agricultural situation observation in Korea, expected to enhance prediction and management of agricultural and environmental changes. However, optical satellite images have limitations in that information can be omitted due to the influence of clouds. To address this, we would like to propose a technique that can provide high-quality information by applying various gap filling techniques to the missing area. The study area is a rice paddy field located in Dangjin, South Chungcheong Province. Sentinel-2A/B satellite data taken in 2021 were used, and field data collected using simultaneous ASD (Field Portable Spectroradiometer) were used for verification. We applied various gap-filling techniques provided by DATimeS (Decomposition and Analysis of Time Series Software) developed by ESA Sentiflex. These techniques reproduced time series patterns similar to raw data, albeit with residual cloud influence. Among these techniques, the GPR algorithm demonstrated the lowest RMSE(≈0.173) during verification against field data. In the future, we anticipate that the GPR technique will enable the generation of high-quality time series data by estimating missing data segments. Such data can significantly benefit crop monitoring efforts, including detecting growth changes and facilitating disaster response.

This study was conducted with the support of Republic of Korea the Rural Development Administration’s research project(task number: PJ016234).

**Keywords:** CAS500-4, Sentinel-2A/B, Crop Monitoring, Gap-filling, GPR, NDVI