

Methodology for estimating the reflection distribution using non-aerial multi-point measurements.

*Garid Zorigoo¹, Badamgarav Enkhbayar¹, Yurino Ishida¹, Ahmad Shaqeer Mohamed Thaheer¹, Nobuyasu Naruse², Yukihiro Takahashi¹

1. Department of CosmoSciences, Graduate School of Science, Hokkaido University, 2. Shiga Medical University

A large portion of agricultural remote-sensing studies focuses on capturing and analyzing the light reflected from the target plant's canopy. And in most cases, these studies use UAVs, planes, or Satellites with optical sensors aligned vertically, or none to little control over viewing angle. Consequently, Remote sensing methods with different and multiple viewing angles are often overlooked. The measurements with different viewing angles i.e. Reflectance Distribution (sensor viewing angle, light source azimuth, elevation): contain extra information compared to sole spectrum data taken from only zenith. For example, canopy structure, physical conditions of leaves, deformations from dehydration can easily affect Reflection Distribution. The Goniometer, a device specialized for this type of measurement, is used for measuring Bidirectional Reflectance Distribution Functions (BRDF) of a target small plant, but it cannot measure the whole area of the crop field. Thus, there is a need for developing a Reflection Distribution estimator for the crop-field. In the study, we will introduce a methodology for estimating Reflection Distribution using our own developed pole-based, non-areal, short-range multiple position measurements (both spectral and 4-band camera) placed near the perimeter of the target field. Furthermore, using this compiled data, it will be investigated for the usability of whether such data and methodology can be used alongside the popular leaf models such as PROSPECT or PROSAIL to extract characteristics.

Keywords: Remote sensing, Imaging, Multi-spectral, Gimbal

