Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

ACG30-13 Room:301B Time:May 25 14:15-14:30

Development of Sun-Induced Chlorophyll Fluorescence database based on ecosystem tower measurement

KATO, Tomomichi[1*] ; TSUJIMOTO, Katsuto[2] ; NASAHARA, Kenlo[3] ; AKITSU, Tomoko[3] ; NAGAI, Shin[4] ; ONO, Keisuke[5] ; SAITOH, Taku M.[6] ; MURAOKA, Hiroyuki[6] ; NODA, Hibiki[7] ; SAIGUSA, Nobuko[7] ; IDE, Reiko[7] ; TAKAHASHI, Yoshiyuki[7]

[1]Research Faculty of Agriculture, Hokkaido University, [2]School of Agriculture, Hokkaido University, [3]Faculty of Life and Environmental Sciences, University of Tsukuba, [4]Japan Agency for Marine-Earth Science and Technology, [5]National Institute for Agro-Environmental Sciences, [6]River Basin Research Center, Gifu University, [7]National Institute for Environmental Studies

Terrestrial ecosystems, forest, grassland and so on, absorbs atmospheric CO2 as a greenhouse gas by photosynthesis, and are thought to mitigate global warming. Estimation of geographical extent of their photosynthesical activity is very crucial for the understanding of global climate change in future. However, conventional vegetation indices (for ex, NDVI, EVI, etc.) representing the greenness of ecosystem, reduce the accuracy for photosynthesis estimation in the particular situations: for ex., the overestimation in evergreen forest in winter and in drought.

Chlorophyll fluorescence is emitted from chloroplast to release the overflown energy of incident sunlight (so-called as Sun-Induced Fluorescence; SIF). Recently, Several studies proved that SIF could be utilized for photosynthesis estimation at the ecosystem spatial scale (Zarco-Tejada et al., 2013, AFM, etc.) as shown by the strong correlationship between SIF and gross primary production (GPP). On the other hand, the availability of SIF is reduced due to small number of ground-based measurement thought highly evaluated potential of them.

This study compiles the SIF derived at five different ecosystems at tower-based flux stations in Japan: paddy field in Mase, grassland in Tsukuba university, deciduous broad-leaf and evergreen needleleaf forests in Takayama, deciduous needleleaf forest in Fujihokuroku. The SIF is calculated in the O2-A band around the wavelength of 760 nm by Fraunhofer line depth (FLD) method. We will compare the SIF to eddy GPP flux during 2005-2013 and show the preliminary analysis on the availability of the SIF for the estimation of ecosystem photosynthesis.

Keywords: Ecosystem Photosynthesis, Remote Sensing, Flux measurement, Satellite measurement