The acclimation effects on responses of chlorophyll fluorescence, spectral reflection, and photosynthesis of leaves

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Carbon dioxide assimilation (Gross Primary Production; GPP) by photosynthesis of terrestrial plants is the largest carbon flux in terrestrial ecosystems, therefore it is very important from the viewpoint of carbon evaluation to accurately estimate it. Satellite remote sensing method is the unique method to estimate GPP from the landscape to global scale. In recent years, it has been found that it is possible to observe chlorophyll fluorescence (Solar-Induced Fluorescence; SIF) of vegetation induced by sunlight from artificial satellites. Here, chlorophyll fluorescence is a phenomenon in which chloroplasts of plants emit red to far-red light when they absorb light. Since its intensity reflects the state of the photosynthetic circuit, SIF is expected as a new indicator of GPP. However, chlorophyll fluorescence is one of three paths (photochemical reaction, heat dissipation, fluorescence) of absorbed light energy, therefore it is necessary to estimate the parameter of heat dissipation from the remote sensing index in order to accurately estimate the yield of the photochemical reaction. In addition, leaves in the ecosystem are acclimated to various environments and have different photosynthetic properties, so it is necessary to study the characteristics of the 3 pathways. In this study, we aimed to investigate the influence of optical acclimation on three paths of photosynthesis, chlorophyll fluorescence, heat dissipation.

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