

Evaluation of the Relationship Between Ground Observed fPAR and Sentinel-2 Derived Vegetation Index in Four Japanese Temperate Forests

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Abstract

Estimating the fraction of photosynthetically active radiation absorbed by vegetation (i.e., fPAR) is crucial for quantifying the carbon uptake activity of terrestrial ecosystems. Satellite-derived vegetation index (i.e., NDVI) is the powerful indicator of fPAR, enabling us to capture spatiotemporal variations in ecosystem carbon uptake activity. Since 2015, Sentinel-2 having about 3-day of revisit interval and 10 m of spatial resolution has been operated. This study evaluates the relationship between ground observed fPAR and Sentinel-2 derived NDVI in four temperate forests in Niigata prefecture, central Japan. Briefly, fPAR for April to July (from 0.44 to 0.96) varied depending on the seasons and the forest ages and types (i.e., two young mixed forests, a mature mixed forest, and a mature needleleaf forest). In the two young mixed forests and the mature needleleaf forest, NDVI was positively correlated with fPAR ($r = 0.81$ to 0.99), where a 0.1 increase in NDVI implied a 0.2 increase in fPAR. However, the correlation between NDVI and fPAR in the mature mixed forest was weak ($r = 0.38$ to 0.53). Thus, this study confirmed that the effectiveness of Sentinel-2 derived NDVI tracking spatiotemporal variations in fPAR and carbon uptake activity likely varied depending on types and ages of forests.

Coming soon

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