

# **Estimation of incident Photosynthetically Active Radiation from MODIS and GOES data**

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Incident photosynthetically active radiation (PAR) is a key variable required by almost all terrestrial ecosystem models. Unfortunately, the current incident PAR products estimated from remotely sensed data at spatial and temporal resolutions are not sufficient for carbon cycle modeling and various applications. In this study, the authors develop a new algorithm for estimating instantaneous incident PAR from the polar-orbiting Moderate Resolution Imaging Spectrometer (MODIS) and Geostationary Operational Environmental Satellite (GOES) data. The temporal observations of each pixel are used to estimate land surface reflectance and look-up tables of both aerosol and cloud are searched, based on the top-of-atmosphere reflectance and surface reflectance for determining incident PAR, including both the direct and diffuse components. The calculation of a daily average PAR value using different methods is also explored. Extensive validation activities are conducted to evaluate the algorithm and products using the ground measurements from several observation networks. The results indicate that this approach can produce reasonable PAR product at 1km resolution and is suitable for global applications, although more quantitative validation activities are still needed.