

## Assimilation of Flux Data into a Primary Production Model

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### Abstract:

Quantifying the carbon (C) dynamics of the terrestrial biosphere is a current and major concern for earth system science. Primary production is a key component of the terrestrial carbon cycle. There are two broad approaches to quantifying Gross Primary production(GPP)- by calculation from model based on remote sensing data, or by measuring fluxes of C directly. However, these data may be patchy, and have gaps or biases.

This paper constructs a regional terrestrial ecosystem GPP estimation model REG-PEM based on light use efficiency theory. 8-day composite GPP are calculated using REG-PEM model in Jiangxi province, China from 2003 to 2004 using MODIS data. Qianyanzhou station locates in Jiangxi province, and there is a flux tower which gets carbon flux data per 30 minutes. The 8-day composite GPP calculated from flux data at Qianyanzhou station. Comparison to MODIS GPP products, we find GPP from flux data higher than model calculation and MODIS GPP products. To improve model calculation accuracy, GPP which is calculated from flux data at Qianyanzhou station is assimilated to REG-PEM and the model parameters are optimized. The optimized algorithm is Gauss-Marquardt-Levenberg, and optimized parameters include carbon dioxide concentration in inner leaf, the optimum air temperature, linear parameter and uncertainty parameter b. GPP estimation model in Qianyanzhou is developed, and the total estimation error improves from 10.6% to 2.0%.

**Keywords:** Remote sensing; Gross Primary Production; Data Assimilation

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