GLOBMAP Leaf Area Index (LAI) Description

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Liu, Y., R. Liu, and J. M. Chen (2012), Retrospective retrieval of long-term consistent global leaf area index (1981–2011) from combined AVHRR and MODIS data, J. Geophys. Res., 117, G04003, doi:10.1029/2012JG002084.

Product Description

GLOBMAP LAI provides a consistent long-term global leaf area index (LAI) product (1981-2011) at 8km resolution on Geographic grid by quantitative fusion of Moderate Resolution Imaging Spectroradiometer (MODIS) and historical Advanced Very High Resolution Radiometer (AVHRR) data. The long-term LAI series was made up by combination of AVHRR LAI (1981–2000) and MODIS LAI (2000–2011). MODIS LAI series was generated from MODIS land surface reflectance data (MOD09A1) based on the GLOBCARBON LAI algorithm (Deng et al., 2006). The relationships between AVHRR observations (GIMMS NDVI (Tucker et al., 2005)) and MODIS LAI were established pixel by pixel using two data series during overlapped period (2000–2006). Then the AVHRR LAI back to 1981 was estimated from historical AVHRR observations based on these pixel-level relationships. Detailed descriptions of algorithm and evaluation of the algorithm see Liu et al. (2012).

Several changes have been made since our paper published:

(1). The clumping effects was considered at the pixel level by employing global clumping index map at 500m resolution (He et al., 2012) instead of land cover-specific clumping index in generation of MODIS LAI. And the new pixel-based AVHRR SR-MODIS LAI relationships were established based on these MODIS LAI series and used for AVHRR LAI retrieval.

(2). The contaminated pixels has been filled by interpolation using a reference data based algorithm, and cloud mask for MOD09A1 data were generated by a new cloud detection algorithm based on time series surface reflectance observations. The papers for interpolation and cloud detection are preparing for submission.

Dataset Characteristics

Spatial Coverage	[180° W~180° E, 63° S~90° N] same as GIMMS NDVI
Temporal Coverage	July, 1981 - December, 2011
Spatial Resolution	0.07272727°
Temporal Resolution	Half month (1981-2000), 8-day (2000-2011)
Projection	Geographic
Data Format	HDF
Input Data	AVHRR GIMMS NDVI (1981-2000) MODIS land surface reflectance (MOD09A1) (2000-2011)
Scale	0.1
Valid Range	0, 100

The products will be improved in the near future:

(1). Uncertainties exist in tropical regions due to the limitation of cloud detection, which will be improved in the next version;

(2). The snow effect on AVHRR in boreal region will be improved in next version;

(3). The LAI is somewhat underestimated in the grass type, which will be improved in next version;

(4). The contribution of overstory and understory canopy will be considered in next version;

(5). The new land cover classification map will be generated and employed in LAI retrieval instead of MODIS land cover product (MCD12Q).

Reference

(1). Deng, F., J. M. Chen, S. Plummer, M. Z. Chen, and J. Pisek (2006), Algorithm for global leaf area index retrieval using satellite imagery, *IEEE Trans. Geosci. Remote Sens.*, 44(8), 2219–2229, doi:10.1109/TGRS.2006.872100.

(2). He, L. M., J. M. Chen, J. Pisek, C. B. Schaaf, and A. H. Strahler (2012), Global clumping index map derived from the MODIS BRDF product, *Remote Sens. Environ.*, 119, 118-130.

(3). Tucker, C. J., J. E. Pinzon, M. E. Brown, D. A. Slayback, E. W. Pak,R. Mahoney, E. F. Vermote, and N. El Saleous (2005), An extended AVHRR 8-km NDVI dataset compatible with MODIS and SPOT vegetation NDVI data, *Int. J. Remote Sens.*, 26(20), 4485–4498, doi:10.1080/01431160500168686.