

Progress toward biophysical products from Landsat

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Goal

- Develop an operational capability to produce vegetation green leaf area index (LAI) from Landsat data by adapting a physically based approach conceived and implemented by the MODIS Science team.
- LAI- Leaf Area Index is defined as one-sided green leaf area per unit ground area in broadleaf canopies and as the projected needle leaf area in coniferous forests.
- LAI is an important variable for quantifying the cycling of water, carbon and nutrients through ecosystems.

Methodology

- Radiometrically correct Landsat TM and ETM+ imagery to surface reflectance
- Use surface reflectance and ancillary parameters to predict LAI using a physically-based algorithm

Physically based algorithm for predicting LAI from OLI data

Ganguly, S., A. Samanta, M. Schull, N. Shabanov, C. Milesi, R. Nemani, Y. Knyazikhin, and R. Myneni, 2008. Generating vegetation leaf area index earth system data records from multiple sensors. Part 1: Theory. RSE, 112:4333–4343.

Ganguly, S., M. Schull, A. Samanta, N. Shabanov, C. Milesi, R. Nemani, Y. Knyazikhin, and R. Myneni 2008. Generating vegetation leaf area index earth system data records from multiple sensors. Part 2: Implementation, Analysis and Validation. RSE., 112:4318–4332.

Current Status

- Thanks to Feng Gao, the LEDAPS team (Jeff Masek, et al.) and Eric Vermote, we are now able to run the process to generate surface reflectance from Landsat data
- Have run this code on a handful of scenes from 1990-2009
- Are collaborating with Randy Wynne who has LAI reference measurements for a number of sites in Virginia.
- This test is so far "blind" -- we don't know the LAI values beforehand so our model-based predictions can be compared without tuning.

Issues

- Uncertainty description for surface reflectance
- Topographic correction
- Radiometric normalization
- Biome description at 30m resolution
- Validation

LEDAPS flow

