

# DAILY LAND SURFACE ALBEDO AND REFLECTANCE ANISOTROPY FROM MODIS

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## ABSTRACT

A new algorithm provides daily values of land surface albedo and angular reflectance at a 500-m spatial gridded resolution using data from the Moderate Resolution Imaging Spectroradiometer (MODIS) instruments currently in orbit on NASA's Terra and Aqua satellite platforms [1, 2]. To overcome the day-to-day variance in observed surface reflectance induced by differences in view and solar illumination angles, the algorithm uses the RossThickLiSparse-Reciprocal bidirectional reflectance model, which is fitted to all MODIS observations of a 500-m resolution cell acquired during a 16-day moving window. Individual observations are weighted by their quality, observation coverage, and proximity to the production date of interest. Product quality is measured by the root mean square error (RMSE) of observations against the best model fit and the ability of the angular sampling pattern of the observations at hand to determine reflectance model parameters accurately.

The algorithm, which is now available to users of direct broadcast satellite data from MODIS, improves on the 8-day temporal resolution of the standard NASA data products and allows daily monitoring of rapid surface radiation and land surface change phenomena such as crop development and forest foliage cycles that are too rapid to be tracked effectively at an 8-day interval. Application of the daily algorithm to MODIS data acquired at a deciduous hardwood site at Bartlett Experimental Forest [3], New Hampshire, USA (Fig 1) demonstrates the ability of the algorithm to capture the phenology of the growing season and much of the variability associated with senescence, dormancy, and snow cover. While the Bartlett tower site has shown to be relatively spatially representative of the larger MODIS grid cell [4], the difference in scale between the measurements must be acknowledged. However, the

daily algorithms captures the maturity and senescence of the canopy foliage well, although the relationship becomes taxed during periods of ephemeral and seasonal snow cover. Further examples of albedo, nadir BRDF-adjusted reflectance and vegetation phenology will be presented and discussed.

## REFERENCES

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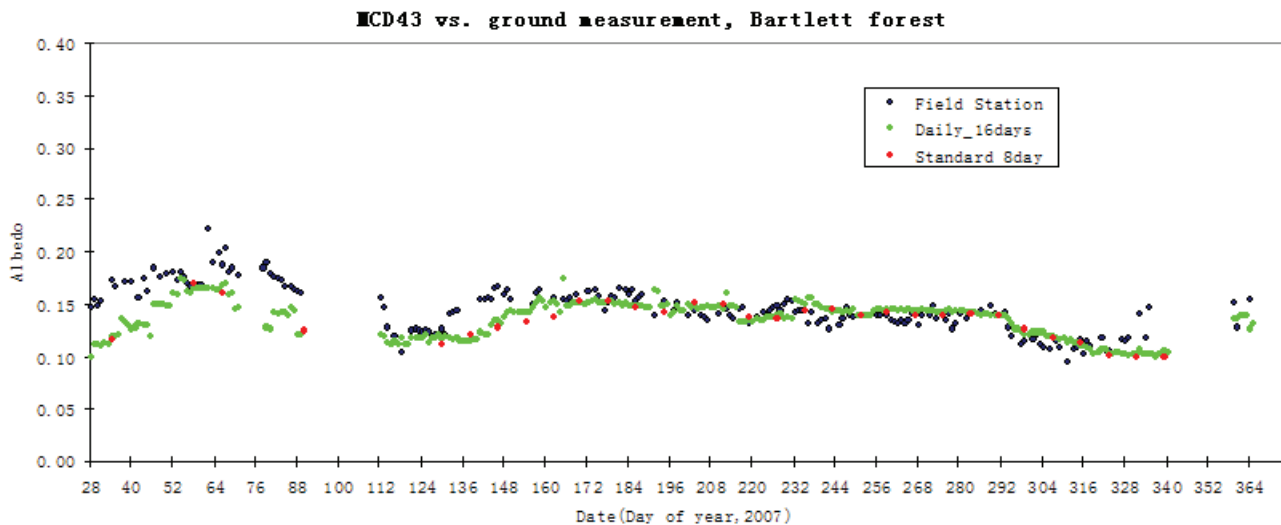


Figure 1. MODIS daily albedo retrievals at Bartlett Experimental Forest, New Hampshire in 2007 (44.065°N –71.288°W) are compared with the Ameriflux tower data. The standard MODIS product MCD43A3 values (retrieved every 8 days based on a 16 day period) are also provided.