1. TITLE

1.1 Data Set Identification

ISLSCP II MODIS (Collection 4) Albedo, 2002

1.2 File Name(s)

The filenames for the various files in this data set use the following naming convention:

modis_*xxx*_*ss*_*yyyymmdd*_*BB*.asc

where,

modis stands for MODIS data.

xxx is the type of parameter:
bsa= Black_Sky_Albedo (Unitless)
wsa= White_Sky_Albedo (Unitless)
qa= albedo quality information (see Section 8.2)

ss is the spatial resolution of the data in both latitude and longitude:
1d 1-degree spatial resolution
hd half-degree spatial resolution
qd quarter-degree spatial resolution

yyyy is the year

mmdd **mm** is the month from 01 to 12 and **dd** is the day for the starting date of the 16-day period of coverage.

BB is the spectral band designation:
b1 Albedo for MODIS band 1 (620-670 nm)
b2 Albedo for MODIS band 2 (841-876 nm)
b3 Albedo for MODIS band 3 (459-479 nm)
b4 Albedo for MODIS band 4 (545-565 nm)

b5 Albedo for MODIS band 5 (1230-1250 nm)
b6 Albedo for MODIS band 6 (1628-1652 nm)
b7 Albedo for MODIS band 7 (2105-2155 nm)
bb1 MODIS broadband albedo 1 (300-700 nm)
bb2 MODIS broadband albedo 2 (700-5000 nm)
bb3 MODIS broadband albedo 3 (300-5000 nm)
qa1 to qa8: 8 MODIS Albedo Quality layers (see description in Section 8.2)

*****NOTE**: Layers qa2, qa3 and qa5 are not applicable to this data set and are not provided.

So the file named **modis_bsa_qd_20020728_b3.asc** is the black sky albedo for MODIS band 3 for the 16-day period starting on July 28, 2002, and at a quarter-degree spatial resolution.

1.3 Revision Date of this Document

November 19, 2009

2. INVESTIGATOR(S)

2.1 Investigator(s) Name and Title

Drs. Alan H. Strahler, Crystal L.B. Schaaf and Feng Gao, Department of Geography/Center for Remote Sensing, Boston University

2.2 Title of Investigation

MODerate resolution Imaging Spectroradiometer (MODIS) Albedo Products

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2.4 Data Set Citation

Strahler, A.H., C.L.B. Schaaf, and F. Gao. 2009. ISLSCP II MODIS (Collection 4) Albedo, 2002. In Hall, Forrest G., G. Collatz, B. Meeson, S. Los, E. Brown de Colstoun, and D. Landis (eds.). Data set. Available on-line [http://daac.ornl.gov/] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAC/958

2.5 Requested Form of Acknowledgment

Users of the International Satellite Land Surface Climatology (ISLSCP) Initiative II data collection are requested to cite the collection as a whole (Hall et al. 2006) as well as the individual data sets. Please cite the following publications when these data are used:

Hall, F.G., E. Brown de Colstoun, G. J. Collatz, D. Landis, P. Dirmeyer, A. Betts, G. Huffman, L. Bounoua, and B. Meeson, The ISLSCP Initiative II Global Data sets: Surface Boundary Conditions and Atmospheric Forcings for Land-Atmosphere Studies, *J. Geophys. Res.*, 111, doi:10.1029/2006JD007366, 2006.

Gao, F., C. Schaaf, A. Strahler, A. Roesch, W. Lucht, and R. Dickinson, The MODIS BRDF/Albedo Climate Modeling Grid Products and the Variability of Albedo for Major Global Vegetation Types, *J. Geophys. Res.*, 110, D01104, doi:10.1029/2004JD005190, 2005.

Lucht, W., C.B. Schaaf, and A.H. Strahler. An Algorithm for the retrieval of albedo from space using semiempirical BRDF models, *IEEE Trans. Geosci. Remote Sens.*, 38:977-998, 2000.

Schaaf, C. B., F. Gao, A. H. Strahler, W. Lucht, X. Li, T. Tsang, N. C. Strugnell, X. Zhang, Y. Jin, J.-P. Muller, P. Lewis, M. Barnsley, P. Hobson, M. Disney, G. Roberts, M. Dunderdale, C. Doll, R. d'Entremont, B. Hu, S. Liang, and J. L. Privette, First Operational BRDF, Albedo and Nadir Reflectance Products from MODIS, *Remote Sens. Environ*., 83:135-148, 2002.

3. INTRODUCTION

3.1 Objective/Purpose

The MODIS Bidirectional Reflectance Distribution Function (BRDF)/Albedo Product (MOD43B) provides measures of clear sky surface albedo every 16 days. Both white-sky albedo (bi-hemispherical reflectance) and black-sky albedo (directional hemispherical reflectance) at local solar noon are provided for 7 spectral bands and 3 broadbands (the narrowband to

broadband conversion is based on Liang et al. (1999)). Since black-sky albedo represents the direct beam contribution while white-sky represents the completely diffuse contribution, these measures can be linearly combined as a function of the fraction of diffuse skylight (itself a function of optical depth) to provide an instantaneous albedo at local solar noon.

3.2 Summary of Parameters

For this ISLSCP Initiative II data collection, global black-sky albedos at local solar noon, white-sky albedo, and quality information for 7 spectral bands (MODIS channels 1-7; centered at 648 nm, 858 nm, 555 nm, 1240 nm, 1640 nm, and 2130 nm, respectively) and 3 broadbands (0.3-0.7 μm, 0.7-5.0 μm, and 0.3-5.0 μm) are provided.

3.3 Discussion

Measures of 1km MODIS surface albedo are derived every 16 days. These albedos have been scaled to quarter-degree, half-degree and one-degree spatial resolutions and made consistent with the ISLSCP II land/sea mask. Products included here represent the second reprocessing of data from January 2002 through December 2002. See Lucht et al. (2000a), Schaaf et al. (2002) and Gao et al. (2005) for specifics.

4. THEORY OF ALGORITHM/MEASUREMENTS

The MODIS instrument was launched on board NASA's *Terra* Spacecraft on 18 December 1999 and began acquiring imagery of the Earth in February 2000. The MODIS BRDF/Albedo Product (MOD43B) relies on multi-spectral, multi-date, cloud-cleared, atmospherically-corrected surface reflectances and a kernel-driven semiempirical BRDF model (RossThick-LiSparseReciprocal) to derive the Bidirectional Reflectance Distribution Function (BRDF) associated with each 1km gridded pixel of land surface (Roujean et al. 1992; Ross 1981; Li and Strahler 1992). These BRDFs are then used to compute the wholly diffuse white-sky albedo (bihemispherical reflectance) and the direct beam black-sky albedo (directional hemispherical reflectance) at local solar noon (Lucht et al. 2000a; Schaaf et al. 2002). These albedo products have been scaled to quarter degree, half degree and one degree spatial resolutions for use by the modeling community (Gao et al. 2005).

5. EQUIPMENT

5.1 Instrument Description

The MODIS instrument provides high radiometric sensitivity (12 bit) in 36 spectral bands ranging in wavelength from 0.4 μm to 14.4 μm. For more details about the MODIS instrument see: http://modis.gsfc.nasa.gov/about/specifications.php

5.1.1 Platform (Satellite, Aircraft, Ground, Person)

The MODIS scanning spectroradiometer is being flown on board both the *Terra* (morning equatorial crossing) and *Aqua* (afternoon equatorial crossing) satellite platforms. Only data from the *Terra* platform were used here.

5.1.2 Mission Objectives

MODIS' objective is to provide a comprehensive series of global observations of the Earth's land, oceans, and atmosphere in the visible and infrared regions of the spectrum in such a way as to view the entire surface of the Earth every two days. Here, the word "comprehensive" refers to the wide spectral range and spatial coverage, as well as the continuous coverage MODIS provides over time.

5.1.3 Key Variables

See above web site for more information.

5.1.4 Principles of Operation

See above web site for more information.

5.1.5 Instrument Measurement Geometry

A ±55 degree cross-track scanning pattern with an orbit altitude of 705 km achieves a 2,330-km swath width and provides global coverage every one to two days.

5.1.6 Manufacturer of Instrument

Raytheon/Santa Barbara Research, Santa Barbara, CA

5.2 Calibration

See the following web site for details on MODIS calibration:
http://www.mcst.ssai.biz/mcstweb/index.html

5.2.1 Specifications

5.2.1.1 Tolerance

See web site above.

5.2.2 Frequency of Calibration

See web site above.

5.2.3 Other Calibration Information

See web site above.

6. PROCEDURE

6.1 Data Acquisition Methods

MODIS Top-Of-Atmosphere (TOA) directional radiances are available from the Goddard Distributed Active Archive Center (DAAC) as are Level 2 Surface Reflectances (product MOD09). Gridded Level 2G and 3 surface reflectances are available from the EROS Data Center (EDC) DAAC. MODIS Level 3 one km and quarter degree albedos and one km nadir BRDF-adjusted surface reflectances are also available from the EDC DAAC. Multiple years of the

MODIS albedo data at 0.05 degree resolution are available from Boston University at http://duckwater.bu.edu/brdf_albedo/albedo16/

6.2 Spatial Characteristics

6.2.1 Spatial Coverage

The coverage is global. The data in the files are ordered from North to South and from West to East beginning at 180 degrees West and 90 degrees North. No data are provided over Polar regions during the northern/southern hemisphere winters due to low solar zenith angles. The size of the areas with no data varies with solar zenith angle.

6.2.2 Spatial Resolution

The data are given in an equal-angle lat/long (geographical) grid. This data set contains data in the same grid but at three spatial resolutions of 1 by 1 degree lat/long, 0.5 by 0.5 degree lat/long, and 0.25 by 0.25 degree lat/long.

6.3 Temporal Characteristics

6.3.1 Temporal Coverage

Data are provided for January 2002 through December 2002.

6.3.2 Temporal Resolution

Data are provided every 16 days.

7. OBSERVATIONS

7.1 Field Notes

Not applicable to this data set.

8. DATA DESCRIPTION

8.1 Table Definition with Comments

Not applicable to this data set.

8.2 Type of Data

8.2.1 Parameter/ Variable Name	8.2.2 Parameter/ Variable Description	8.2.3 Data Range	8.2.4 Units of Measurement	8.2.5 Data Source
Black Sky Albedo	Surface black-sky albedo at local solar noon derived from MODIS multidate surface reflectances in bands 1-7 and 3 broadbands. Albedo is the fraction of incident solar radiation that a surface reflects -- in this case a direct beam solar	Min: 0 Max:1 Water=-99 No Data over land=-88	unitless	MODIS

8.2.1 Parameter/ Variable Name	8.2.2 Parameter/ Variable Description	8.2.3 Data Range	8.2.4 Units of Measurement	8.2.5 Data Source
	illumination condition.			
White Sky Albedo	White sky albedo under entirely diffuse solar illumination conditions for MODIS bands 1-7 and 3 broadbands	Min: 0 Max:1 Water=-99 No Data over land=-88	unitless	MODIS
Albedo Quality Information	Eight layers of Albedo QA associated with MODIS Albedo products (see the table below for descriptions)	See table below Water=-99 No Data over land=-88	Flags or percents (see below)	MODIS

Albedo Quality Information (qa1 to qa8)	
1) Mandatory QA 0 = Majority processed, good quality 1 = Majority processed 2 = Majority not processed (not used) 3 = Majority not processed	**2) Period used**[1] 0 = 16 days 1 = 32 days
3) Satellite used (AM/MISR/PM)[2] 0 = AM 1 = AM/PM 2 = AM/PM/MISR 3 = AM/MISR 4 = PM 5 = PM/MISR 6 = MISR	**4) BRDF Quality** 0 = Majority full inversion 1 = Majority magnitude inversion 2 = (not currently used) 3 = Majority Fill value
5) Percent Land[3] Layer no longer provided.	**6) Percent Snow** 0-100%
7) Local Solar Noon[4] 0 = 0-5 deg 8 = 40-45 deg 1 = 5-10 deg 9 = 45-50 deg 2 = 10-15 deg 10 = 50-55 deg 3 = 15-20 deg 11 = 55-60 deg 4 = 20-25 deg 12 = 60-65 deg 5 = 25-30 deg 13 = 65-70 deg 6 = 30-35 deg 14 = 70-75 deg 7 = 35-40 deg 15 = >75 deg	**8) Percent Contribution [of inputs to pixel]**[4] 0 = 5% or less data (land) 1 = 5% - 15% " 2 = 15% - 30% " 3 = 30% - 50% " 4 = 50% - 70% " 5 = 70% - 85% " 6 = 85% - 95% " 7 = 95% or more

[1] Because only 16-day MODIS products are provided this layer has been omitted.
[2] Because only data from the AM *Terra* overpass are used this layer has been omitted.
[3] Data not provided here. Please refer to the ISLSCP Initiative II Land/Water mask for these data.

[4] Ranges are exclusive of upper limits (e.g. 0-5 deg. implies an angle greater than or equal to zero and less than 5 degrees).

8.3 Sample Data Record

No applicable to this data set.

8.4 Data Format

All of the files in the ISLSCP Initiative II data collection are in standard ARC GIS ASCII Grid format. The file format consists of six lines of header information followed by numerical fields of varying length, which are delimited by a single space and arranged in columns and rows. The files at different spatial resolutions each contain the following numbers of column and rows:

1 degree: 360 columns by 180 rows
1/2 degree: 720 columns by 360 rows
1/4 degree: 1440 columns by 720 rows

All files are gridded to a common equal-angle lat/long grid, where the coordinates of the upper left corner of the files are located at 180 degrees W, 90 degrees N and the lower right corner coordinates are located at 180 degrees E, 90 degrees S. Data in the files are ordered from North to South and from West to East beginning at 180 degrees West and 90 degrees North. The files have all had the ISLSCP II land/water mask applied to them. Water bodies are encoded as -99 and any missing data over land as -88.

Albedo Files

The multi-spectral albedo files are all stored as real number values from 0 to 1.

Albedo Quality Files

The albedo quality information files are all stored with each pixel written as an integer. Each pixel corresponds to the same pixel in the multi-spectral albedo files for each measurement period. The same fill values for water and missing data over land used for the albedo data are also used (i.e. -99, -88 respectively). The descriptions of the values used in the quality layers are given in Section 8.2.2 above.

8.5 Related Data Sets

There are multiple albedo data sets in the ISLSCP Initiative II data collection, each with specific temporal and/or spatial attributes. Users should refer to the overview document for albedo as well as Hall et al. (2006) for a more in depth discussion of these products. Other albedo data sets in this collection include an albedo product for February and July 1995 from the Advanced Very High Resolution Radiometer (AVHRR), a 5-year AVHRR albedo climatology produced by NOAA-NESDIS (National Environmental Satellite Data and Information Service), coarse scale albedos from the Earth Radiation Budget Experiment (ERBE) and a snow-free albedo produced using the FASIR-NDVI (Fourier-Adjusted, Sensor and Solar zenith angle corrected, Interpolated, Reconstructed-Normalized Difference Vegetation Index) data set. The companion to this MODIS albedo data set is the MODIS Spatially Complete Albedo data set for 2002 (after Moody et al. 2004).

9. DATA MANIPULATIONS

9.1 Formulas

For details refer to Lucht et al. (2000a), Schaaf et al. (2002) and Gao et al. (2005). The semiempirical kernel-driven BRDF model represents the weighted sum of an isotropic parameter (fiso) and two functions (or kernels) of viewing and illumination geometry. One of these kernels (Kvol) is derived from volume scattering radiative transfer models, while the other (Kgeo) is derived from surface scattering and geometric shadow casting theory. The BRDF parameters (fiso , fvol, and fgeo) computed are the spectrally dependent weights of each of these kernels used in forming the overall reflectance (R):

$$R = fiso + fvol\ Kvol + fgeo\ Kgeo \quad (1)$$

9.1.1 Derivation Techniques/Algorithms

As described in Section 4, MODIS clear sky surface reflectances are accumulated over a 16-day period and used with a BRDF model to characterize the spectral BRDF associated with each land surface location at a 1km resolution. Once the BRDF has been determined, it is integrated over all view angles to compute the black-sky albedo and additionally over all solar angles to compute the wholly diffuse white sky albedo. The spectral albedos are converted to broadband albedos with narrow to broadband factors based on the modeling work by Liang et al. (1999). These one km products have then been scaled up to 1 degree, half degree and quarter degree and provided on a global geographical (lat/long) grid.

9.2 Data Processing Sequence

Multi-spectral, multi-date, cloud-free, atmospherically corrected, directional reflectances from each 16-day period are used to derive the MODIS surface albedos. If insufficient high quality observations are available (due to cloud cover etc.) to perform a full inversion, an *a priori* determination of the shape of the surface BRDF is coupled with the available surface reflectances to derive the surface BRDF and albedos (see Strugnell and Lucht 2001; Strugnell et al. 2001 for a description of the *a priori* BRDF database).

9.2.1 Processing Steps and Data Sets

See Lucht et al. (2000a), Schaaf et al. (2002) and Gao et al. (2005).

9.2.2 Processing Changes

The products provided here represent the second reprocessing of the MODIS data products.

9.2.3 Additional Processing by the ISLSCP II Staff

All of these files were processed using the ISLSCP II land/water masks for consistency. The only processing done by the ISLSCP II staff has been to change ‘missing data over land’ cells in the QA files from their given values of -99 to a value of -88. All other data were double checked for consistency against the ISLSCP II masks.

9.3 Calculations

The MODIS BRDF/Albedo products utilize linear models and thus are easily scaled from 1km to quarter/half/one degree data sets. The data are originally computed on an Integerized Sinusoidal Grid and are reprojected to a geographical (lat/lon) grid. The quarter degree product is a standard MODIS data product available from EDC DAAC. The half and one degree versions were computed particularly for this effort.

9.3.1 Special Corrections/Adjustments

Both the direct beam (black-sky) albedo at local solar noon and wholly diffuse (white-sky) albedo are provided as products. As these represent the two atmospheric extremes, the albedo under a particular atmospheric condition at local solar noon can be modeled quite accurately as an interpolation between the two as a function of the fraction of diffuse skylight (which is a function of optical depth). For specifics see Lucht et al. (2000a) and Schaaf et al. (2002).

9.4 Graphs and Plots

Not available at this revision.

10. ERRORS

10.1 Sources of Error

Errors in clear-sky albedo come from cloud contamination of the scene, instrument errors, and uncertainties in the models used in modeling the BRDF. The QA quality flags assigned to each location consider the quality of the input surface reflectances, the sampling available for each BRDF inversion and the resultant model fit to the available observations. If no clear observations are acquired during a 16-day period, a fill value is reported for each 1km location -- such fill values are taken into account in scaling the data up to the lower spatial resolutions provided here.

10.2 Quality Assessment

10.2.1 Data Validation by Source

The MODIS Albedo product is currently being validated with field campaigns in Beltsville, MD, USA (Liang et al. 2002); Barton Bendish, UK; Mongu Zambia; Skukuza, South Africa; and Liangchen, Shunyi and Yucheng, China. Prelaunch validation activities are described in Lucht et al. (2000b) and Barnsley et al. (2000).

10.2.2 Confidence Level/Accuracy Judgment

See Lucht (1998) and Lucht and Lewis (2000) for more details.

10.2.3 Measurement Error for Parameters and Variables

See Lucht (1998) and Lucht and Lewis (2000) for more details.

10.2.4 Additional Quality Assessment Applied

Not available at this revision.

11. NOTES

11.1 Known Problems with the Data

These data have been assigned a validated status. The dark target atmospheric correction applied to the TOA radiances is not used over snow surfaces and other very bright surfaces. Instead a uniform optical depth value is used to represent aerosols over these regions. The QA quality flags assigned to each location take into consideration the quality of the input surface reflectances.

11.2 Usage Guidance

See http://geography.bu.edu/brdf/userguide/index.html for user guidance on the MODIS albedo products. If users require spatially complete albedo data it is recommended that they use the MODIS Spatially Complete Albedo data set for 2002. This is a companion data set that uses the same MODIS albedo data provided in this data set.

11.3 Other Relevant Information

None.

12. REFERENCES

12.1 Satellite/Instrument/Data Processing Documentation

http://geography.bu.edu/brdf/userguide/index.html

http://modis.gsfc.nasa.gov/

http://modis-land.gsfc.nasa.gov/

12.2 Journal Articles and Study Reports

Barnsley, M. J., P. D. Hobson, A. H. Hyman, W. Lucht, J.-P. Muller, and A. H. Strahler, Characterizing the spatial variability of broadband albedo in a semi-desert environment for MODIS validation, *Remote Sens. Environ.*, 74, 58-68, 2000.

Gao, F., C. Schaaf, A. Strahler, A. Roesch, W. Lucht, and R. Dickinson, The MODIS BRDF/Albedo Climate Modeling Grid Products and the Variability of Albedo for Major Global Vegetation Types, *J. Geophys. Res.*, 110, D01104, doi:10.1029/2004JD005190, 2005.

Hall, F.G., E. Brown de Colstoun, G. J. Collatz, D. Landis, P. Dirmeyer, A. Betts, G. Huffman, L. Bounoua, and B. Meeson, The ISLSCP Initiative II Global Data sets: Surface Boundary Conditions and Atmospheric Forcings for Land-Atmosphere Studies, *J. Geophys. Res.*, 111, doi:10.1029/2006JD007366, 2006.

Li, X. and A.H. Strahler, Geometric-optical bidirectional reflectance modeling of the discrete crown vegetation canopy: Effect of crown shape and mutual shadowing, *IEEE Trans. Geosci. Remote Sens.*, 30, 276-292, 1992.

Liang, S., A. H. Strahler, and C. Walthall, Retrieval of Land Surface Albedo from Satellite Observations: A Simulation Study, *J. App. Meteor*., 38, 712-725, 1999.

Lucht, W., Expected retrieval accuracies of bidirectional reflectance and albedo from EOS-MODIS and MISR angular sampling, *J. Geophys. Res*, D-103, 8763-8778, 1998.

Lucht, W., and P. Lewis. Theoretical noise sensitivity of BRDF and albedo retrieval from the EOS-MODIS and MISR sensors with respect to angular sampling, *Int. J. Remote Sensing*, 21, 81-98, 2000.

Lucht, W., C.B. Schaaf, and A.H. Strahler. An Algorithm for the retrieval of albedo from space using semiempirical BRDF models, *IEEE Trans. Geosci. Remote Sens*., 38, 977-998, 2000a.

Lucht, W., A.H. Hyman, A. H. Strahler, M. J. Barnsley, P. Hobson, J.-P. Muller, A comparison of satellite-derived spectral albedos to round-based broadband albedo measurements modeled to satellite spatial scale for a semi-desert landscape, *Remote Sens. Environ*, 74, 85-98, 2000b.

Moody, E. G., M. D. King, S. Platnick, C. B. Schaaf, and F. Gao, 2004: Spatially complete global spectral surface albedos: Value-Added data sets derived from *Terra* MODIS land products. *IEEE Trans. Geosci. Remote Sens*., 43:144-158, 2004.

Ross, J. K., *The Radiation Regime and Architecture of Plant Stands*, Dr W. Junk, Norwell, MA, 392pp, 1981.

Roujean, J.-L., M. Leroy, and P. Y. Deschamps, A bidirectional reflectance model of the Earth's surface for the correction of remote sensing data, *J. Geophys. Res*., D-97, 20455-20468, 1992.

Schaaf, C. B., Feng Gao, Alan H. Strahler, W. Lucht, X. Li, T. Tsang, N. Strugnell, X. Zhang, Y. Jin, J.-P. Muller, P. Lewis, M. Barnsley, P. Hobson, M. Disney, G. Roberts, M. Dunderdale, C. Doll, R.P. D'Entremont, B. Hu, S. Liang, J.L. Privette and D. Roy. First Operational BRDF, Albedo and Nadir Reflectance Products from MODIS, *Remote Sens. Environ*., 83:135-148, 2002.

Strugnell, N., W. Lucht, and C. Schaaf, A global albedo data set derived from AVHRR data for use in climate simulations, *Geophys. Res. Let.* , 28, 191-194, 2001.

Strugnell, N., and W. Lucht, Continental-scale albedo inferred from AVHRR data, land cover class and field observations of typical BRDFs, *J. Climate*, 14, 1360-1376, 2001.

13. DATA ACCESS

13.1 Data Access Information

The ISLSCP Initiative II data are archived and distributed through the Oak Ridge National Laboratory (ORNL) DAAC for Biogeochemical Dynamics at http://daac.ornl.gov.

13.2 Contacts for Archive

E-mail: uso@daac.ornl
Telephone: +1 (865) 241-3952

13.3 Archive/Status/Plans

The ISLSCP Initiative II data are archived at the ORNL DAAC. There are no plans to update these data.

14. GLOSSARY OF ACRONYMS

AVHRR	Advanced Very High Resolution Radiometer
BRF	Bidirectional Reflectance Factor
BRDF	Bidirectional Reflectance Distribution Function
BSA	Black-Sky Albedo
DAAC	Distributed Active Archive Center
ERBE	Earth Radiation Balance Experiment
FASIR-NDVI	Fourier Adjusted, Solar and view zenith angle correction, Interpolation, and Reconstruction of NDVI
GSFC	Goddard Space Flight Center (NASA)
ISLSCP	International Satellite Land Surface Climatology Project
MODIS	MODerate resolution Imaging Spectroradiometer
NASA	National Aeronautics and Space Administration
NDVI	Normalized Difference Vegetation Index
NESDIS	National Environmental Satellite Data and Information Service (NOAA)
NOAA	National Oceanic and Atmospheric Administration
ORNL	Oak Ridge National Laboratory
WSA	White-Sky Albedo