1. TITLE

1.1 Data Set Identification

ISLSCP II AVHRR Albedo and BRDF, 1995

1.2 File Name(s)

The file names for the various Albedo files based on Advanced Very High Resolution Radiometer (AVHRR) satellite data use the following naming convention:

avhrr_BSA: Black_Sky_Albedo (unitless)
avhrr_WSA: White_Sky_Albedo (unitless)
vis: Albedo for Visible broadband (350-680nm)
swir: Albedo for Shortwave Infrared (SWIR) broadband (680-3000nm)
brd: Albedo for Solar broadband (350-3000nm)
1d: 1 degree spatial resolution
hd: half degree spatial resolution
qd: quarter degree spatial resolution
1995mm: Where 1995 is the year and mm is the month (either 02 for February or 07 for July).

As an example, the file **avhrr_BSAbrd_hd_199502.asc** is the Black Sky broadband solar Albedo for February 1995 at 1/2 degree spatial resolution.

The file names for the various AVHRR BRDF model parameter files use the following naming convention:

avhrr_BRDF: BRDF model parameters (unitless)
vis: BRDF model parameters for Visible broadband (350-680nm)

swir: BRDF model parameters for Shortwave Infrared broadband (680-3000nm)
brd: BRDF model parameters for Solar broadband (350-3000nm)
c1: Isotropic BRDF model parameter (see Strugnell et al. 2001).
c2: Volumetric BRDF model parameter (see Strugnell et al. 2001).
c3: Geometric BRDF model parameter (see Strugnell et al. 2001).
1d: 1 degree spatial resolution
hd: half degree spatial resolution
qd: quarter degree spatial resolution
1995mm: Where 1995 is the year and mm is the month (either 02 for February or 07 for July).

As an example, the file **avhrr_BRDFswir_c2_1d_199507.asc** is the Volumetric BRDF model parameter for the Shortwave Infrared broadband for July 1995 at 1 degree spatial resolution.

The files with a **.dif** file extension are ASCII tables of "differences", or points in the original file that did not match the ISLSCP II Land/Water mask, and were removed from the ASCII map files (see Section 8.2).

1.3 Revision Date of this Document

October 26, 2009

2. INVESTIGATOR(S)

2.1 Investigator(s) Name and Title

Dr. Alan H. Strahler,
Dr. Crystal L.B. Schaaf,
Dr. Elena Tsvetsinskaya,
Department of Geography/Center for Remote Sensing
Boston University

2.2 Title of Investigation

AVHRR 1995 Albedo/BRDF Products.

2.3 Contacts (For Data Production Information)

	Contact 1	Contact 2
2.3.1 Name	Dr. Alan H. Strahler	Dr. Crystal Schaaf
2.3.2 Address	Depart. of Geography, Boston Univ. 675 Commonwealth Ave	Depart. of Geography, Boston Univ 675 Commonwealth Ave
City/St.	Boston, MA	Boston, MA
Zip Code	02215	02215
Country	USA	USA
2.3.3 Tel. No.	617-353-5984	617-358-0503
Fax No.	617-353-3200	617-353-3200
2.3.4 E-mail	alan@bu.edu	schaaf@bu.edu

	Contact 3	Contact 4 (ISLSCP II)
2.3.1 Name	Dr. Elena Tsvetsinskaya	Dr. Eric Brown de Colstoun
2.3.2 Address	Depart. of Geography, Boston Univ. 675 Commonwealth Ave	NASA/GSFC Code 614.4
City/St.	Boston, MA	Greenbelt, MD
Zip Code	02215	20771
Country	USA	USA
2.3.3 Tel. No.	617-358-0503	(301) 614-6597
Fax No.	617-353-3200	(301) 614-6695
2.3.4 E-mail	elenat@bu.edu	ericbdc@ltpmail.gsfc.nasa.gov

2.4 Data Set Citation

Strahler, A.H., C.L.B. Schaaf, and E. Tsvetsinskaya. 2009. ISLSCP II AVHRR Albedo and BRDF, 1995. In Hall, Forrest G., G. Collatz, B. Meeson, S. Los, E. Brown de Colstoun, and D. Landis (eds.). ISLSCP Initiative II Collection. 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/928

2.5 ISLSCP Initiative II Collection References

Users of the International Satellite Land Surface Climatology (ISLSCP) Initiative II data collection are requested to reference 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 Datasets: Surface Boundary Conditions and Atmospheric Forcings for Land-Atmosphere Studies, J. Geophys. Res., 111, doi:10.1029/2006JD007366, 2006.

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.

3. INTRODUCTION

3.1 Objective/Purpose

The AVHRR Albedo/BRDF Products provide measures of clear sky surface albedo and BRDF model parameters for two months in 1995, representing the northern hemisphere winter and summer. 4 BRDF parameters, white-sky albedo (bihemispherical reflectance) and black-sky albedo (directional hemispherical reflectance) at local solar noon are generated for three broad bands. 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 actual or instantaneous albedo at local solar noon.

3.2 Summary of Parameters

Black-sky albedos at local solar noon, white-sky albedos, and BRDF model coefficients for 3 b roadbands (350-680nm, 680-3000nm, and 350-3000nm) for February and July 1995. The files are available at three spatial resolutions of 1/4, 1/2 and 1 degrees in both latitude and longitude.

3.3 Discussion

Measures of 1km AVHRR albedo and BRDF modeled parameters for two months of 1995 were devised, as described in Strugnell and Lucht (2001) and Strugnell et al. (2001). Predetermined archetypal BRDFs were assigned to each global land pixel based on a land cover map, on the season, and on field measured BRDFs. This assumes that intraclass BRDFs are broadly similar and that differences are one of degree rather than substantial changes in the shape of the BRDF function. Observed Bidirectional Reflectance Factors (BRF) are then compared with BRFs generated from the archetypal BRDF functions and a multiplicative factor, which minimizes the least-squares difference between them, is computed. This factor is then applied to the black-sky and white-sky albedos associated with the archetypal BRDFs to generate AVHRR-derived albedos values for each location. Land cover dependent laboratory spectra were convolved with the AVHRR channel response functions and an estimated bottom of atmosphere solar irradiance spectrum to compute narrow to broadband conversion coefficients. These broadband albedo values have been re-gridded to quarter degree, half degree and one degree spatial resolutions as a contribution to the International Satellite Land Surface Climatology Project (ISLSCP) Initiative II data collection. The ISLSCP II staff has re-processed these data to make them consistent with the land/water boundaries of the ISLSCP II land/water mask. Files are provided to allow the user to reconstruct the original data.

4. THEORY OF ALGORITHM/MEASUREMENTS

Global Advanced Very High Resolution Radiometer (AVHRR) 1km observations were acquired from the EROS Data Center (EDC) as 10 day maximum Normalized Difference Vegetation Index (NDVI) composites for February and July of 1995 (Eidenshink and Faundeen, 1994). The data were further composited to 30-day values to minimize cloud cover and coupled with an *a priori* determination of the Bidirectional Reflectance Distribution Function (BRDF) shape for each land location (Strugnell and Lucht, 2001; Strugnell et al., 2001). The *a priori* archetypal BRDF dataset was prepared by fitting a semiempirical kernel-driven BRDF model (RossThick-LiSparseReciprocal) to field measurements of directional reflectance and assigning the resultant BRDF shapes (Roujean, et al., 1992; Ross, 1981; Li and Strahler, 1992; Lucht et al., 2000) to an ecological land cover classification of the globe (Loveland et al., 2000). Versions of the *a priori* BRDF dataset, which represent the growing season, the dormant leaf-off season and the dormant season with underlying snow, were available to be coupled with the AVHRR data to develop multiplicative factors to compute the wholly diffuse white-sky albedo (bihemispherical reflectance) and the direct beam black-sky albedo (directional hemispherical reflectance) at local

solar noon. Narrow to broadband conversion factors (Strugnell and Lucht, 2001; Strugnell et al., 2001) are used to convert the spectral values to values in the shortwave, visible and SWIR broadbands. All of these AVHRR-derived products have been re-gridded to quarter degree, half degree and one degree spatial resolutions for use by the modeling community.

5. EQUIPMENT

5.1 Instrument Description

The instrument is the Advanced Very High Resolution Radiometer (AVHRR), providing measurements in the visible (0.58-0.68 μm), near-IR (0.725-1.1 μm), mid-IR (3.55-3.93 μm) and thermal IR window (10.5-11.5 and 11.5-12.5 μm) spectral regions.

5.1.1 Platform (Satellite, Aircraft, Ground, Person)

The AVHRR scanning radiometer used to create this data set was flown on board the NOAA-14 (afternoon equatorial crossing) satellite platform.

5.1.2 Mission Objectives

The AVHRR global data were originally acquired at EDC to support the International Geosphere Biosphere Programme-Data and Information System (IGBP-DIS) Land Cover Project (Loveland et al., 2000). See the web site http://edc2.usgs.gov/1KM/ for more details.

5.1.3 Key Variables

Not applicable to this data set.

5.1.4 Principles of Operation

Not applicable to this data set.

5.1.5 Instrument Measurement Geometry

The satellite orbits the Earth 14 times each day from 833 km above its surface. The cross-track scanning geometry of the AVHRR provides data for a 2399km wide swath.

5.1.6 Manufacturer of Instrument

ITT, Fort Wayne, IN.

5.2 Calibration

The Calibration on the NOAA-14 instrument has been monitored and is described at: http://edc2.usgs.gov/1KM/

6. PROCEDURE

6.1 Data Acquisition Methods

AVHRR data and land cover information is available from the EROS Data Center (http://edc2.usgs.gov/1KM/). The albedo and BRDF datasets provided were generated at Boston University (Stugnell and Lucht, 2001; Strugnell et al., 2001; http://geography.bu.edu/brdf/brdf.html).

6.2 Spatial Characteristics

6.2.1 Spatial Coverage

The coverage is global for all land areas. Data in files are ordered from North to South and from West to East beginning at 180 degrees West and 90 degrees North. Due to poor illumination in the hemispheric winters, Arctic and Antarctic areas are not included. Because of persistent cloud cover, most of Papua/New Guinea and many nearby islands did not have any data during February.

6.2.2 Spatial Resolution

The original Local Area Coverage (LAC) AVHRR data were provided at 1.1km spatial resolution and regridded to a 1km grid for coupling with the *a priori* BRDF database. The resultant products are given in an equal-angle lat/long (geographical) grid that has spatial resolutions of 1 x 1 degree, 0.5 x 0.5 degree, and 0.25 x 0.25 degree in latitude and longitude.

6.3 Temporal Characteristics

6.3.1 Temporal Coverage

Data are provided for February 1995 and July 1995.

6.3.2 Temporal Resolution

The data are provided as monthly values.

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 Unit of Measurement	8.2.5 Data Source
1) Albedo Maps (.asc)				
Black Sky Albedo	Black-sky albedo derived from AVHRR data from 1995. Albedo is the fraction of incident solar radiation that a surface reflects - in this case under entirely direct solar illumination conditions.	Min:0.0 Max:1.0 Water=-99 No Data on Land = -88	unitless	AVHRR
White Sky Albedo	White-sky albedo derived from AVHRR data from 1995. Albedo is the fraction of incident solar radiation that a surface reflects - in this case under entirely diffuse solar illumination conditions.	Min:0.0 Max:1.0 Water=-99 No Data on Land = -88	unitless	AVHRR
BRDF parameters	Three BRDF Model Parameters (isotropic, volumetric and geometric) derived from AVHRR data from 1995.	Min:0.0 Max:1.0 Water=-99 No Data on Land = -88	unitless	AVHRR
2) Differences Tables (.dif)				
Lat	Latitude for the center of a cell. South latitudes are negative.	Min=-90 Max=90	Decimal Degrees	Earth Grid
Lon	Longitude for the center of a cell. West longitudes are negative.	Min=-180 Max=180	Decimal Degrees	Earth Grid
Data_Removed	Albedo value in each cell of the original file that did not match the ISLSCP II land/water mask, and was removed.	Min:0.0 Max:1.0	Unitless	Original Data

8.3 Sample Data Record

The "differences" file is an ASCII table with some header lines, then the Latitude and Longitude coordinates of each removed point, plus the value of that point. See the sample below.

```
ISLSCP II Differences for file 'avhrr_BRDFbrd_c1_1d_199502.asc'.
Contains Lat-Lon coordinates and data for each point in the original file
that differed from the ISLSCP II Land/Water mask, and thus was removed.
```

```
Lat,Lon,Data_Removed
70.5,22.5,0.0469
70.5,24.5,0.0663
70.5,30.5,0.0376
70.5,31.5,0.0390
70.5,52.5,0.0391
70.5,53.5,0.0392
69.5,-138.5,0.0379
69.5,-129.5,0.0393
69.5,-125.5,0.0463
69.5,-124.5,0.0989
```

8.4 Data Format

All of the files in the ISLSCP Initiative II data collection are in the 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:

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

All values are written as floating point values. Missing values are assigned the value of –99 on all data layers. Missing values over land are assigned the value of -88.

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 1180 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 ASCII map files (with the extension of ".asc") have all had the ISLSCP II land/water mask applied to them. All points removed from the original files are stored in "differences" files (with the extension ".dif"). These ASCII files contain the Latitude and Longitude location of the cell-center of each removed point, and the data value at that point. There is one ".dif" file for each ASCII map file.

8.5 Related Data Sets

There are multiple albedo data sets in the ISLSCP Initiative II data collection. Users should refer to the overview document for albedo for a discussion of these products. Other albedo data sets in this collection include a 16-day Albedo product from the MODerate Resolution Imaging Spectroradiometer (MODIS) for 2001, a 5-year albedo climatology from AVHRR 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) data set.

9. DATA MANIPULATIONS

9.1 Formulas

For details refer to Strugnell and Lucht, 2001 and Strugnell et al., 2001. 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, 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, AVHRR 10-day maximum NDVI composited reflectances were further composited to 30-day values and each monthly value was coupled with *a priori* determinations of local BRDF shape (as determined from field data and an ecosystem classification) to generate 1-km resolution black-sky and white-sky albedo values. Growing season values and dormant values are swapped by hemisphere in the July and February products.

These 1-km products were then scaled up to 1 degree, half degree and quarter degree resolutions and provided on a global geographical (lat/long) grid. Note that a uniform albedo of 0.04 was used for those water/ocean pixels that were incorporated in scaling the data to the coarser resolutions in coastal regions. Furthermore, note that users interested in ascertaining the percentage of land located in each grid box at each resolution should refer to the MODIS 16 day Albedo product QA (This collection) for an estimation of that percentage.

9.2 Data Processing Sequence

For a full description of the processing of the AVHRR data, see

http://edc2.usgs.gov/1KM/

9.2.1 Processing Steps and Data Sets

AVHRR 30-day composited data were coupled with an archetypal BRDF database to obtain appropriate BRDF parameters and albedo values for February and July. See Strugnell and Lucht, 2001; Strugnell et al., 2001; Lucht et al., 2000 and Schaaf et al., 2002. Data were then scaled up to 1 degree, half degree and quarter degree resolutions.

9.2.2 Processing Changes

None.

9.2.3 Additional Processing by the ISLSCP II Staff

The ISLSCP II staff has processed the original files by comparing the original data set for consistency against the ISLSCP II land/water mask. Missing data over land cells in these files were coded with a value of -88. Points where the data set contained a data value and the ISLSCP II land/water contained water were removed and replaced with the value -99. New ASCII table files containing the removed points (points that

didn't match the land/water mask), also called "differences" files with the extension ".dif", were also created. These files contain the Latitude and Longitude of the cell-center of each removed point, and the data value at that point.

9.3 Calculations

These products utilize linear BRDF models and thus are easily scaled from 1km to quarter/half/one degree data sets. The data are originally computed on a Goode-Homolosine Grid and are reprojected to a geographical (lat/long) grid. The quarter, 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 these represent the two atmospheric extremes, the albedo under a particular atmospheric condition 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., 2000 and Schaaf et al., 2002.

9 .4 Graphs and Plots

See next page.

10. ERRORS

10.1 Sources of Error

Errors in albedo come from cloud contamination of the scene, subpixel snow impacts, instrument errors, uncertainties in the models used in modeling the BRDF and errors in applying the narrow to broadband conversion. Furthermore these data were not rigorously aerosol corrected so some atmospheric contamination remains.

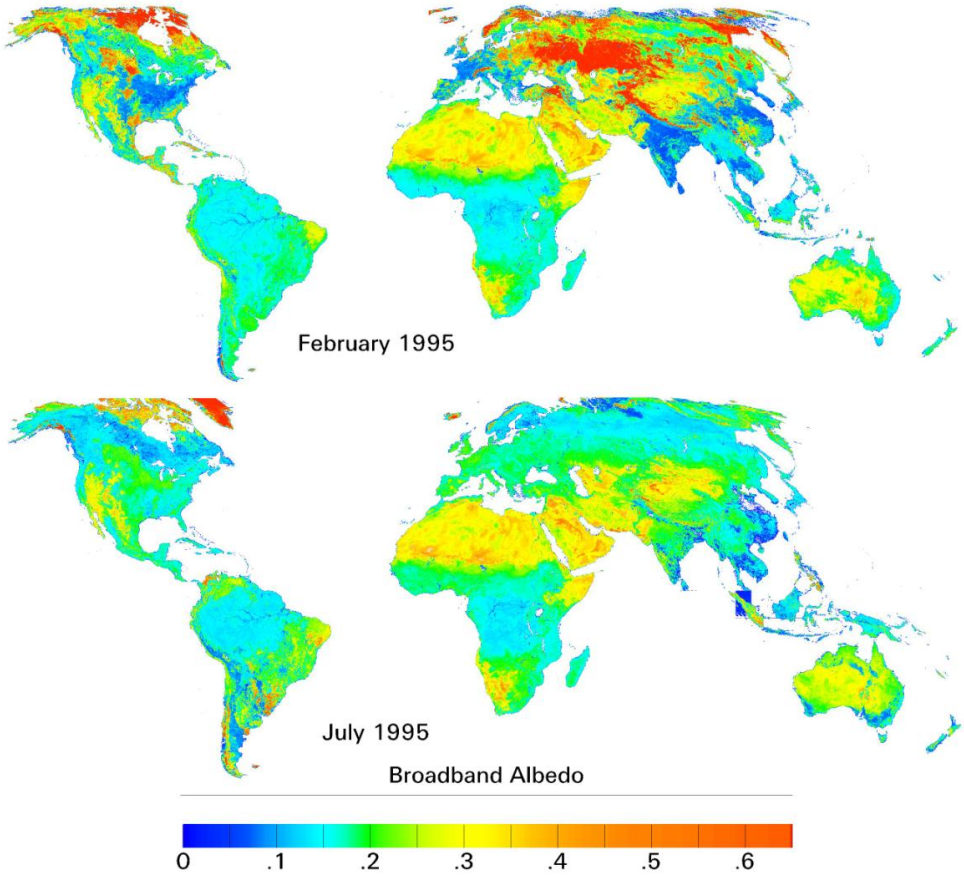

Figure 1. *Black sky broadband (0.35-3.0 μm) albedo for two months of 1995 using global 1km AVHRR data (Strugnell et al. 2001).*

10.2 Quality Assessment

10.2.1 Data Validation by Source

See Strugnell and Lucht, 2001; Strugnell et al., 2001 for more details.

10.2.2 Confidence Level/Accuracy Judgment

See Strugnell and Lucht, 2001; Strugnell et al., 2001 for more details.

10.2.3 Measurement Error for Parameters and Variables

See Strugnell and Lucht, 2001; Strugnell et al., 2001 for more details.

10.2.4 Additional Quality Assessment Applied

None.

11. NOTES

11.1 Known Problems with the Data

These results are based on maximum NDVI composite AVHRR reflectances. As such they are not explicitly corrected for cloud and aerosol. Therefore areas of persistent cloudiness have lingered as contaminated albedos (e.g. Tropical Africa and Amazonia). See Strugnell and Lucht, 2001 and Strugnell et al., 2001 for a more detailed discussion. Also see Section 10.1.

The ISLSCP II staff has noted that the number of missing values is not the same for all albedo and BRDF data sets. The inconsistencies are found across parameters but also across spectral bands. Users should be aware of this issue.

11.2 Usage Guidance

See Lucht et al, 2002; Strugnell and Lucht, 2001 and Strugnell et al., 2001 for more detailed discussion on algorithm development and the MODIS albedo product user guide for more information on product use.

Also see http://geography.bu.edu/brdf/brdf.html for more information.

The original data provided to the ISLSCP II staff can be re-created by combining the data provided here with the ".dif" files that are also provided.

12. REFERENCES

12.1 Satellite/Instrument/Data Processing Documentation

http://geography.bu.edu/brdf/brdf.html
http://edc2.usgs.gov/1KM/

12.2 Journal Articles and Study Reports

Eidenshink, J. C., and J. L. Faundeen, The 1-km AVHRR global land data set: First stages in implementation, *Int. J. Remote Sens.*, 15, 3443-3462.

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 Datasets: 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.

Loveland, T. R., B. C. Reed, J. F. Brown, D. O. Ohlen, J. Zhu, L. Yang, and J. W. Merchant, 2000. Development of a global land cover characteristics database and IGBP DISCover from 1-km AVHRR Data, *Int. J. Remote Sens.*, 21, 1303-1330.

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.

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, in press, *Remote Sens. Environ.*, 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.gov
Telephone: +1 (865) 241-3952

13.3 Archive/Status/Plans

The ISLSCP Initiative II data are archived at the ORNNL 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
FASIR (NDVI)	Fourier Adjusted, Solar and view zenith angle correction, Interpolation, and Reconstruction of NDVI
EDC	EROS Data Center
ERBE	Earth Radiation Balance Experiment
GSFC	Goddard Space Flight Center (NASA)
IGBP-DIS	International Geosphere Biosphere Programme-Data and Information System
ISLSCP	International Satellite Land Surface Climatology Project
LAC	Local Area Coverage
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
SWIR	Shortwave Infrared
WSA	White-Sky Albedo