1. TITLE

1.1 Data Set Identification

ISLSCP II CRU05 Climate Time Series for Global Land Areas, 1986-1995

1.2 Database Table Name(s)

Not applicable to this data set.

1.3 File Name(s)

This data set contains monthly climate time series data created by the Climatic Research Unit (CRU) at the University of East Anglia, U.K, for every year covering the period 1986 to 1995.

There are 13 data files with this data set which includes 1 ASCII changemap file and 22 *.zip data files for the monthly climate time series data (1986-1995) which are named using the following convention:

cru5_*variable*_*Xdeg*.zip

where:

cru5	Identifies these data as CRU version 5.
variable	This is the climate variable name. **See Table 1 below for a list of the variables and abbreviations used in the file names**.
Xdeg	This identifies the spatial resolution of the data: Can be "1d" for 1-degree or "hd" for half-degree resolutions in both latitude and longitude.
cru5	Identifies these data as CRU version 5.

variable This is the climate variable name. **See Table 1 below for a list of the variables and abbreviations used in the file names**.

The 0.5 degree (hd) .zip files also contain 12 "differences" (.dif) files. These are ASCII tables of "differences", points that didn't match the ISLSCP Initiative II Land/Water mask, and were removed from or added to the ASCII map files. These files are only available for the original 0.5 degree data set because the 1.0 degree version was created by the ISLSCP II staff by averaging the 0.5 degree data (see Section 9.2.3).

cru5*_climate_hd_changemap.asc:* A gridded ASCII file which shows the results of applying the 0.5 degree ISLSCP II land/water mask to the 1986-1995 time series: all points added ("1"), all points unchanged ("0"), and all points removed ("-1"). These files are only available for the original 0.5 degree data set.

Table 1. List of climate variables included in this data set. Abbreviations for the variables as used in the filenames are also given. An "X" indicates whether the particular variable is included in the mean monthly climatology or monthly time series data. See Section 8.2 for units of measurement.

Climate Variables

Variable Abbreviation	Climate Variables
cloud_covr	Cloud Cover
diurnal_tmp	Diurnal Temperature Range
precip	Precipitation
temp_mean	Mean Temperature
vapor_pres	Vapor Pressure
wetday_frq	Wet Day Frequency

1.4 Revision Date of this Document

June 13, 2011

2. INVESTIGATOR(S)

2.1 Investigator(s) Name and Title

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2.2 Title of Investigation

CRU05 Monthly Climatology (1961-1990) and Monthly Climate Time Series (1901-1995/6) for Global Land Areas [part of the project, "The missing carbon sink", funded by the UK Natural Environment Research Council].

2.3 Contacts (For Data Production Information)

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2.4 Data Set Citation

New, M., P. Jones, and M. Hulme. 2011. ISLSCP II CRU05 Climate Time Series for Global Land Areas, 1986-1995. 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/1014

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.

Acknowledgements to the Climatic Research Unit, University of East Anglia for provision of the data. The following two papers should be cited when referring to the CRU05 climate data:

New, M., M. Hulme and P. Jones (1999). "Representing twentieth-century space-time climate variability. Part I: Development of a 1961-90 mean monthly terrestrial climatology." *Journal of Climate* **12**: 829-856.

New, M., M. Hulme and P. Jones (2000). "Representing twentieth-century space-time climate variability. Part II: Development of 1901-1996 monthly grids of terrestrial surface climate." *Journal of Climate* **13**(13): 2217-2238.

3. INTRODUCTION

3.1 Objective/Purpose

These data were originally developed by the Climatic Research Unit (CRU) for application to F. Ian Woodward's global biogeochemical model to simulate the terrestrial carbon cycle over the 20th century, under the auspices of a project funded by the UK Natural Environment Research Council. Since then the data have been used in numerous studies where *spatially complete* climate data are required at regional, continental and global scales. For example, these data have been used for gridded biogeochemical, biological, agricultural and hydrological modelling, either over the 20th century, or as a baseline climate data set for climate change impacts assessments.

3.2 Summary of Parameters

Table 1 in Section 1.3 provides a complete listing of the climate variables provided here (also see Section 8.2 for more in depth information). This data set includes gridded monthly totals or means, for the years 1986-1995, for land areas excluding Antarctica. The data are provided at two spatial resolutions of 0.5 and 1.0 degree in both latitude and longitude. The 1986-1995 time series provided for this International Satellite Land Surface Climatology Project

(ISLSCP) Initiative II is a subset of a much larger CRU data set that covers the period from 1901 to 1996.

3.3 Discussion

3.3.1 Monthly Time Series (1986-1995)

This data is a temporal sub-sample of the 0.5 degree latitude/longitude gridded data set of monthly terrestrial surface climate over for the period 1901-1996. The data comprise a suite of six climate elements: precipitation, mean temperature, diurnal temperature range, wet-day frequency, vapor pressure, and cloud cover. The spatial coverage extends over all land areas, including oceanic islands, but excluding Antarctica.

The primary variables, precipitation, mean temperature and diurnal temperature range, were interpolated directly from station observations. The resulting time-series were compared with other, coarser resolution, data sets of similar temporal extent. The remaining climatic elements, termed secondary variables, were interpolated from merged data sets, comprising station observations and, in regions where there were no station data, synthetic data estimated using predictive relationships with the primary variables.

These data represent an advance over earlier products because (i) it has higher spatial resolution than other data sets of similar temporal extent, (ii) it has longer temporal coverage than other products of similar spatial resolution; (iii) it encompasses a more extensive suite of surface climate variables than available elsewhere, (iv) it includes an elevation-dependence in the underlying climatology and (v) the construction method ensures that strict temporal fidelity is maintained.

The data files have been produced by CRU and modified by the staff of the ISLSCP II data collection to match the land/water boundaries of the ISLSCP II land/water mask. Files are provided that show the differences between the original CRU data and the ISLSCP II land/water mask. “Differences” files are also provided containing any data point in the original data that has been changed (see Section 9.2.3). This was done to ensure land/water consistency between the many different data sets in this collection. Further, the ISLSCP II staff have created a 1.0 degree version of the data by averaging the original 0.5 degree data. These 1.0 degree data are given to provide a complete ISLSCP Initiative II collection at this resolution but are recommended for browse use only. Users should refer to the original 0.5 degree data for more in depth analyses.

4. THEORY OF ALGORITHM/MEASUREMENTS

All data sets are derived through interpolation of surface climate meteorological station observations onto a 0.5 degree lat/long Earth grid. The 1.0 degree data are derived through averaging of the 0.5 degree data.

4.1 Monthly Time Series (1901-1996)

Thin-plate splines were used to interpolate the climate surfaces from station observations, as a function of latitude, longitude and elevation. The original thin-plate spline fitting technique was described by Wahba (1979), while Hutchinson (1995) provides a theoretical description of

their application to surface climate variables such as precipitation. The technique is robust in areas with sparse or irregularly spaced data points. Thin-plate splines are defined by minimising the roughness of the interpolated surface, subject to the data having a predefined residual: this is accomplished by determining the amount of data smoothing that is required to minimise the generalised cross validation (GCV).

For each variable, the terrestrial surface was divided into a number of geographic tiles over which separate spline functions were fitted. The size of the tiles varied primarily according to station density, but also as a function of spatial complexity of the climate variable. Where necessary, tiles were forced to overlap by at least 5.0 degrees latitude and longitude so as to minimize edge effects. The number of stations in a tile varied between about 200 and 1,000.

A "background" tile was also interpolated, encompassing the entire globe between sixty degrees S and eighty five degrees N, using a subset of the available normals that included all stations not within the tiles mentioned above (i.e. oceanic islands) and some 750 evenly distributed continental stations.

The final fitted spline functions for each tile were applied to a 0.5 degree digital elevation model (DEM) to derive the climate grids for each variable. The tiles were then merged to produce a global land field, excluding Antarctica.

5. EQUIPMENT

5.1 Instrument Description

5.1.1 Platform (Satellite, Aircraft, Ground, Person)

All data are ground-based measurements from meteorological instruments, and observer estimates for clouds.

5.1.2 Mission Objectives

To create a spatially continuous gridded data set at 0.5 degree lat/long resolution of key surface monthly climate variables important for modelling earth surface processes.

5.1.3 Key Variables

Primary variables (based solely on observations)

- precipitation
- temperature
- diurnal temperature range

Secondary variables (based on observations and primary variables)

- wet-day frequency
- vapor pressure
- cloud cover

5.1.4 Principles of Operation

Standard instrumentation and observing practice, on a national and/or organisational basis. In most instances instrument metadata were not available, and various assumptions about instrument type, height etc are made (see New *et al*. 1999 for details).

5.1.5 Instrument Measurement Geometry

See Section 5.1.4.

5.1.6 Manufacturer of Instrument

See Section 5.1.4.

5.2 Calibration

5.2.1 Specifications

Not applicable to this data set.

5.2.1.1 Tolerance

Not applicable to this data set.

5.2.2 Frequency of Calibration

Not applicable to this data set.

5.2.3 Other Calibration Information

Not applicable to this data set.

6. PROCEDURE

6.1 Data Acquisition Methods

Station data were obtained from numerous sources over many years by various personnel at the Climatic Research Unit, most notably Mike Hulme, Phil Jones and Mark New (see New *et al.* 1999, 2000). Major sources include National Meteorological Agencies, Global Telecommunications System/Global Climate Observing System (GTS/GCOS), the Global Historical Climatology Network (GHCN), WMO 1961-1990 climate normals, Centro Internacional de Agricultura Tropical (CIAT) and Institut de Recherche pour le Développement (IRD), France. A full list of sources is available in New *et al* (1999, 2000).

6.2 Spatial Characteristics

6.2.1 Spatial Coverage

The coverage is for global land areas, excluding Antarctica. The land mask is derived from 5-minute lat/lon Terrainbase (http://www.ngdc.noaa.gov/mgg/topo/) digital elevation/bathymetry data set, area averaged to 0.5 degrees lat/long 0.5 degree. Cells are considered land if more than 25 (25%) of Terrainbase cells are land. Additionally, small ocean islands are also considered to be land, even when their area is less than 25 Terrainbase cells. For consistency, the Initiative II staff applied the ISLSCP land-water mask and differences were handled as described in Section 9.2.3.

6.2.2 Spatial Resolution

The data are provided on two equal angle Earth grids with spatial resolutions of 0.5 and 1 degree in both latitude and longitude.

6.3 Temporal Characteristics

6.3.1 Temporal Coverage

The monthly time series data cover the period from January 1986 through December 1995. Again this ISLSCP II data set is only a subset of a larger CRU data set covering the period 1901 to 1996 (http://www.ipcc-data.org/obs/cru_ts2_1.html) .

6.3.2 Temporal Resolution

Monthly totals or averages.

7. OBSERVATIONS

7.1 Field Notes

None.

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[1]	8.2.4 Units of Measurement	8.2.5 Data Source
Monthly Time Series (1986-1995) Maps (*.asc)				
cloud_covr	Cloud cover	min=0	Oktas	cloud observations sunshine measurements
diurnal_tmp	Diurnal temperature range	min=0	degrees C	Air temperature thermometers
precip	Monthly precipitation as analyzed from precip-gauge measurements.	min = 0	mm	Rain-gauge
temp_mean	Monthly mean temperature	N/A	degrees C	Air temperature thermometers
vapor_pres	Vapor pressure	min=0.1	Hpa	wet/dry bulb electronic synthetic
wetday_frq	Wet day frequency (number of days per month with >=0.1mm precipitation)	min=0 max=all days in month	days	Rain-gauge (days with >0.1mm)
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	Value in each original file that doesn't match the land/water mask, and was	Varies by Parameter	Varies by Parameter	Original Data

	removed.			
Data_Added	Value added to the original file because the land/water mask indicated land, so an interpolated point was added.	Varies by Parameter	Varies by Parameter	Computed
Interpolation_Level	The number of times the interpolation routine was run to get a value for this point. The higher the number, the less reliable the value is.	Min=1 Max=5	Unitless	Computed
Change Map (*_changemap.asc)				
Point Changed	Differences between the ISLSCP II land/water mask and the original data: -1 = ISLSCP II mask is water and original data is land (data removed) 0 = Data sets agree over land or water (data unchanged) ≥1 = ISLSCP II mask is land and original data is water or missing (data interpolated)	Min=-1 Max=1	See 8.2.2	Computed

***NOTE:** Data range values are not available at this revision. A value of –99 is assigned to water bodies and –88 to missing data over land.

8.3 Sample Data Record

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

```
ISLSCP II Differences for file 'cru5_cloud_covr_hd_198601.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.
Points added using interpolation are listed at the bottom of this file.

Lat,Lon,Data_Removed
83.75,-37.75,3.7
83.75,-37.25,3.6
83.75,-36.75,3.6
83.75,-36.25,3.6
83.75,-35.75,3.6
83.75,-35.25,3.5
83.75,-34.75,3.5
83.75,-34.25,3.5
83.75,-33.75,3.5
83.75,-33.25,3.5
83.75,-32.75,3.5
83.75,-32.25,3.5
   "      "
   "      "
   "      "
Lat,Lon,Data_Added,Interpolation_Level
81.25,60.25,-88,1
80.25,54.75,5.83,1
```

```
78.75,-74.25,2.9,1
78.25,-113.75,3.45,1
68.75,52.25,7,1
64.75,-172.25,5.8,1
64.75,-65.25,4.67,1
```

8.4 Data Format

All of the files in the ISLSCP Initiative II data collection are in the standard ArcGIS ASCII Grid format. The file format consists of numerical fields of varying length, which are delimited by a single space and arranged in columns and rows. All values in these files are written as integer numbers. However, note the very large maximum values given in Section 8.2.3. In all layers areas with no data over oceans are assigned the value of –99. Areas with no data over land (i.e. Antarctica) are assigned the value of –88.

The files at different spatial resolutions each contain the following numbers of columns and rows:

One degree: 360 columns by 180 rows

1/2 degree: 720 columns by 360 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 map 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 half-degree 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. At the bottom of these files are also a list of all points added to the file through "nearest neighbor averaging" interpolation, where the land/water mask indicated land but there was no data in the original file. There is also a column called "Interpolation_Level" that contains the number of times the interpolation routine was run to get a value for that point. The higher the number, the less reliable the value is. There is one ".dif" file for each ASCII map file. Note: the added points for Antarctica were not included in the ".dif" files because there is no real data there.

The "change map" files show the results of applying the land/water mask, as a viewable ASCII map: all points added (positive number, containing the "Interpolation_Level", see above), all points unchanged ("0"), and all points removed ("-1"). There is only a file for the half-degree data, as the 1-degree data was created through averaging.

WARNING: The 1.0 x 1.0 degree product is for browse use only. These data files are averaged from the original 0.5 x 0.5 degree pixels. Thus the data values at specific pixels are not exact. Use this data with caution and refer to the original half-degree data files for specific information.

8.5 Related Data Sets

A major update of the CRU05 data to 2001 is presently underway. Updates will be made available through the Climatic Research Unit (http://iridl.ldeo.columbia.edu/SOURCES/.UEA/.CRU/.New/.CRU05/.monthly/) and/or the Intergovernmental Panel on Climate Change (IPCC) Data Distribution Centre (DDC)

(http://www.ipcc-data.org/obs/cru_climatologies.html). ISLSCP II project information and data sets may also be obtained from the Oak Ridge National Laboratory Distributed Active Archive Center (ORNL DAAC) http://daac.ornl.gov/ISLSCP_II/islscpii.shtml.

9. DATA MANIPULATIONS

9.1 Formulas

9.1.1 Derivation Techniques/Algorithms

See Section 4.

9.2 Data Processing Sequence

9.2.1 Processing Steps and Data Sets

Station data were received in a variety of paper and digital forms, and in a variety of formats and measurement units. In general, the processing steps for the data set are:

- reformatting to standard CRU format and units of measurement.
- quality control of station information –name, country, station ID (matching with existing data at CRU), coordinates and elevation.
- quality control of station data (see New *et al*. 1999, 2000 for details).
- merging with existing station data (either normals or time-series).
- interpolation.
- visual quality control through inspection of interpolated fields.
- re-interpolation after corrections to data.
- data storage.

9.2.2 Processing Changes

None given.

9.2.3 Additional Processing by the ISLSCP Staff

The original data files submitted to the ISLSCP Initiative II staff contained one year of a variable in each file, with 12 separate monthly maps concatenated together, one after the other. Each value was in a 5-character fixed-length field, and there was considerable 'touching' of the fields (no delimiting space between them). The Monthly Time Series data files had an origin at the Greenwich Meridian and the South Pole while the Monthly Mean climatology data files had an origin at the Greenwich Meridian and the North Pole. Missing data were encoded as -9999. This data was at the half-degree resolution only.

The data files were reprocessed and each yearly variable file was broken up into 12 monthly files, and each line was parsed for the correct number of values and each value was given a one space-delimiter. The missing data values of -9999 were changed to -99. All data files were processed so that the origin (upper-left corner) of each file was at the dateline and the North Pole.

Also, the units for many of the original files were 10 times normal units ("degrees C x 10" for example). The only parameters in normal units were Monthly Time Series

precipitation and Monthly Mean cloud cover. The "10x" files were processed by dividing each value by 10. Missing data values were kept at -99.

The half-degree files were then further processed by comparing the data files for consistency against the ISLSCP II land/water mask. Missing land data (usually in Antarctica) in these files were added in the form of -88 values. All added values outside of the Antarctic had these -88 missing values replaced with "nearest neighbor averaging" interpolation. New ASCII table files containing the removed and added 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 or added point, and the data value at that point. The added points also contain a column called "Interpolation_Level" that contains the number of times the interpolation routine was run to get a value for that point. The higher the number, the less reliable the value is. Note: the added points for Antarctica were not included in the ".dif" files because there is no real data there.

Finally, a "change map" was created for the half-degree data, showing the results of applying the land/water mask, as a viewable ASCII map: all points added (positive number, containing the "Interpolation_Level", see above), all points unchanged ("0"), and all points removed ("-1").

Seeing a need for a 1.0 degree product, the ISLSCP Initiative II Staff took the 0.5 data files and "averaged" them down to one degree. For each 1.0 degree cell, 4 0.5 degree cells were averaged, ignoring missing data cells, and filling the new cell with -99 if three or more 0.5 degree cells were -99 as well. Then the data files were renamed to the current naming scheme (see Section 1.3). Thus, there are no ".dif" files or "change maps" for the 1.0 degree data.

WARNING: The 1.0 x 1.0 degree product is for browse use only. These data files are averaged from the original 0.5 x 0.5 degree pixels. Thus the data values at specific pixels are not exact. Use this data with caution and refer to the original half-degree data files for specific information.

9.3 Calculations

9.3.1 Special Corrections/Adjustments

Data in different formats (units of measurement, instrument type) were converted to a standard format (see New *et al*, 1999, 2000 for details):

- precip – inches to mm
- temp_mean – none, but where available, temperature is calculated as mean of maximum and minimum temperature; where tmax and tmin were not available, mean temperature as provided by source is used.
- wetday_frq – wet day frequencies for >1mm threshold were converted to an equivalent for a >0.1mm threshold, using an empirical conversion algorithm.
- vapor_pres – approximately 40% of data were provided as relative humidity; these were converted to vapor pressure at dew point using standard formulations (New et al, 1999, 2000)

- cloud_covr – nearly half the "cld" data were provided as sunshine hours of sunshine percent; these were converted to cld. Nearly half the "sunp" data were provided as cloud; these were converted to sunp

9.4 Graphs and Plots

The data can visualized at the Intergovernmental Panel on Climate Change (IPCC) Data Distribution Centre (http://www.ipcc-data.org/). Also see New et al. (1999, 2000) for figures.

10. ERRORS

See section 11 notes for additional discussion of known errors and problems.

10.1 Sources of Error

Errors arise from several sources, and have not been quantified:

- Input data – some erroneous station data will escape quality control, particularly when the process is automated, as is necessary for large data sets. Errors in station input data will therefore "cascade" through to the final product.
- Interpolation error – even with perfect station data, errors in interpolation away from station control is inevitable, and vary according to climate element and location. Average interpolation error for climate means is assessed through implicit Generalised Cross-Validation (GCV) during interpolation and are reported in New *et al* (1999). Errors for anomaly fields are not reported, but are highly dependent on station density and the spatial coherence of climate anomalies.

10.2 Quality Assessment

10.2.1 Data Validation by Source

See Section 9.

10.2.2 Confidence Level/Accuracy Judgement

1986-1995 Climate Series

Error estimates for the gridded series were not determined, but vary according to station density. It is recommended that reference is made to the station location data or maps of station locations in New et al (2000) for a qualitative indication of accuracy.

Regional series for precipitation, mean temperature, and diurnal temperature range were compared to the Hulme (1994) and Dai (1997) precipitation data, the Jones et al (1999) temperature and the Easterling et al (1997) diurnal temperature range data sets. These are described in detail in New et al (2000).

10.2.3 Measurement Error for Parameters and Variables

See Section 10.1, 10.2 and New *et al*. (1999,2000).

10.2.4 Additional Quality Assessment Applied

None.

11. NOTES

11.1 Known Problems with the Data

The precipitation measurements have not been corrected for the systematic gauge-measuring error (in general an underestimation of the true precipitation which varies between 5% and more than 100% of the measured data for monthly accumulations depending on the weather conditions during the month). Correction of the gridded data is recommended, but left to the users, by making use of, for example, Legates (1987) climatological correction factors. The correction factors from Legates (1987) are available in this ISLSCP INITIATIVE II data collection as a part of the Global Precipitation Climatology Centre (GPCC) Rain gauge-Only Global Precipitation data set.

Since being used, a number of specific problems have been discovered, and are likely to continue to come to light as researchers focus on specific aspects of the data set. A list of "known problems" is maintained on an ad-hoc basis on the IPCC-DDC Web site, which is a source for the full 1901-1996 data set (http://ipcc-ddc.cru.uea.ac.uk/). As of September 2002, the list is as follows:

Wet Days

Area affected	Reason for error
Brazil (Amazonia)	Conversion was required from available data (the threshold was 1.0mm). The method used probably gave a positive bias and thus overestimated the number of wet days.
Spain and Spanish stations in N. Africa	Error over definition for approximately 40 stations. Threshold was assumed to be 0.1mm but was in fact 1.0mm.
Syria	Error over definition for all stations. Threshold was assumed to be 0.1mm but was in fact 1.0mm.

Diurnal Temperature Range

Area affected	Reason for error
Greenland *(see below)	Lack of station data in central Greenland has caused (too) high values to be interpolated to the region.
Poland	Some stations were found to have their range-values based on monthly extreme max. and min. temperature values instead of average values - therefore values too large.

Relative Humidity

Station data relating to humidity was split roughly half-and-half between pressure (VP) or relative humidity (RH). The conversion of VP to RH, or vice versa, (see New *et al*.) does pose

problems in some parts of the world – notably in the coldest areas in winter months. This is due to a loss of instrumental precision at very low temperatures. Small errors are magnified when conversion (using mean temperature) is undertaken. For this reason, systematic differences in winter RH are apparent according to political divisions in areas like the northern Russia and northern Canada. In addition, mean monthly RH is affected by the timing of daily readings. For this reason, mean RH may be biased if mean monthly values are not based on true daily mean values, or if the time of measurement of daily temperatures and RH do not coincide.

Greenland – all variables

The interior of Greenland is poorly covered by meteorological observation. This coupled with the presence of the high elevation ice cap makes interpolation of climate normals very difficult due to the potential for unusual lapse rates. It is likely that significant bias may be present with all variables for the interior of the landmass (e.g. diurnal temperature range and precipitation too high).

11.2 Usage Guidance

In data void/sparse continental areas, the quality of the analysis results will be poor. Maps of station coverage are available in New *et al*. (1999, 2000) and lists showing the location of stations used to construct both the "base" 1961-1990 mean climate grids and the monthly anomaly fields are available from the following web site:
http://www.cru.uea.ac.uk/~timm/grid/CRU_CL_1_0_text.html#Intro

The 1.0 x 1.0 degree version created by the ISLSCP Initiative II staff is recommended for browse use only. These data files are averaged from the original 0.5 x 0.5 degree pixels. Thus the data values at specific pixels are not exact. Use these data with caution and refer to the original 0.5 degree data files for specific information.

11.3 Other Relevant Information

None.

12. REFERENCES

12.1 Satellite/Instrument/Data Processing Documentation

None.

12.2 Journal Articles and Study Reports

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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 ORNL DAAC. There are no plans to update these data.

14. GLOSSARY OF ACRONYMS

ADW	Angular Distance Weighting
CDD	Correlation Decay Distance
CIAT	Centro Internacional de Agricultura Nacional
CRU	Climatic Research Unit (University of East Anglia)
DAAC	Distributed Active Archive Center

DDC	Data Distribution Centre (IPCC)
GCOS	Global Climate Observation System
GCV	Generalized Cross Validation
GHCN	Global Historical Climatology Network
GPCC	Global Precipitation Climatology Centre
GSFC	Goddard Space Flight Center (NASA)
GTS	Global Telecommunications System
IPCC	Intergovernmental Panel on Climate Change
IRD	Institut de Recherche pour le Developpement
ISLSCP	International Satellite Land Surface Climatology Project
NASA	National Aeronautics and Space Administration
ORNL	Oak Ridge National Laboratory
RH	Relative Humidity
VP	Vapor Pressure
WMO	World Meteorological Organization