CRU TS 2.0: Introduction

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Contents

1 Introduction

This document provides a summary of the climate data-set labelled CRU TS 2.0. Any use of this data-set should be duly acknowledged by referring to the published paper (Mitchell et al, 2003).

2 Variables

There are five variables supplied in this data-set, each constrained to lie within the range of the possible (Table 1).

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Table 1: Climate variables supplied as part of CRU TS 2.0. Where limits were placed on the values that a variable could take, the limits are indicated.

[var]	variable	units	minimum	maximum
cld	cloud cover	percentage	0	100
dtr	diurnal temperature range	degrees Celsius	0.1	
pre	precipitation	mm	0	
tmp	temperature	degrees Celsius		
vap	vapour pressure	hecta-Pascals	0	

Table 2: UEA gridded data-sets of climate observations previously developed.

data-set	space	time	variety	reference
CRU CL 1.0	0.5^o	1961-90	climatology	New et al, 1999
CRU CL 2.0	10'	1961-90	climatology	New et al, 2002
CRU CL 2.1	10'	1961-90	climatology	Mitchell et al, 2003
CRU TS 1.0	0.5^o	1901-1995	time-series	New et al, 2000
CRU TS 1.1	0.5^o	1996-1998	time-series	Mark New, pers. comm.
CRU TS 1.2	0.5^o	1995-2000	time-series	Mitchell et al, 2003

3   Resolution

The data is supplied on a 0.5 degree grid, covering the global land surface. The data grid is envisaged as a rectangle with boundaries at the poles and the international date line. Data is only supplied for land boxes on the grid, which total 67420. The data is supplied at a monthly time-step for 1901-2100.

4   Construction

Previous work had produced the data-sets summarised in Table 2. The present data-set (CRU TS 2.0) builds upon these previous data-sets. The general procedure was as follows:

1. The CRU station databases were updated to ensure sufficient station coverage to 2000.[1]

2. The station data for 1901–2000 was anomalised relative to 1961–1990.[2]

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[1]Cloud cover data was only available for 1971-1996; this was augmented by sunshine duration data for 1991-2000.

[2]Cloud cover [sunshine duration] was anomalised relative to 1971–1995 [1991–1995], for the period 1971–1996 [1997-2000].

3. The station anomalies were interpolated onto a 0.5 degree grid. (In locations in space and time where station data was unavailable, the gridded values were 'relaxed' towards zero.)[3]

4. The derivation of the grids of cloud cover anomalies for 1901–2000 was a special case. The sunshine anomaly grids were converted to cloud cover grids under the assumption that they had the same magnitude as, but opposite sign to, their respective cloud cover anomalies. Both sets of cloud cover anomaly grids were reanomalised relative to 1961–1990 by calculating the difference between the original and 1961–1990 base periods from CRU TS 1.0. The cloud time-series was completed by appending the the grids for 1901–1970 from CRU TS 1.0[4] to produce a complete record for 1901–2000.

5. The time-series were adjusted to ensure that the mean anomaly for the base period (1961–1990) was zero at each grid-box.[5] Care was taken to ensure that the gridded anomalies 'relaxed' to zero remained at zero after the adjustment.[6]

6. The grids of anomalies (relative to 1961–1990) for 1901–2000 were combined[7] with the global climatology for 1961–90 at 0.5 degrees (CRU CL 1.0) to obtain grids of absolute values.

7. The data in the grids was constrained to lie within the range of the physically possible (Table 1).

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[3]The sparse vapour pressure data was augmented by 'synthetic data' estimated from diurnal temperature range, and was only 'relaxed' towards zero as a last resort.

[4]The grids from CRU TS 1.0 were first anomalised relative to 1961–1990.

[5]Although the mean for the baseline is certainly zero for the station anomalies, this is not necessarily the case at the grid-box level, because of the changes over time in the selection of stations contributing information to a grid-box.

[6]A minor point is that the grids in CRU TS 1.0 — and therefore in CRU TS 2.0 for cloud cover in 1901–1970 — were not correctly relaxed to zero in areas where station data was unavailable, so there are slight differences between the 1961–90 normal and the 'relaxed' values in such cases.

[7]For precipitation, the operation was multiplicative, since the precipitation anomalies were relative (percentages). For all other variables the operation was additive.

5 References

Mitchell, T. D., et al., 2003: A comprehensive set of climate scenarios for Europe and the globe. *In preparation*

New, M., Hulme, M., and Jones, P., 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.[8]

New, M., Hulme, M., and Jones, P., 2000: Representing Twentieth-Century Space-Time Climate Variability. Part II: development of 1901–96[9] monthly grids of terrestrial surface climate. Journal of Climate 13: 2217–2238.[10]

New, M., Lister, D., Hulme, M., and Makin, I., 2002: A high-resolution data set of surface climate over global land areas. Climate Research 21:1–25.[11]

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[8]This data-set is known as CRU CL 1.0

[9]In fact, only 1901–1995 were developed.

[10]This data-set is known as CRU TS 1.0

[11]This data-set is known as CRU CL 2.0