ATEAM climate data-set v1.02: Introduction

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1 Introduction

This document provides a summary of the ATEAM climate data-set v1.02. Although it is possible that additions may be made to this data-set, the most important information is all present in this version. Any use of this data-set should be duly acknowledged by referring to the published paper[1].

2 Variables

There are five variables supplied in this data-set, each constrained to lie within the range of the possible:

[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	

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[1]Mitchell, T. D., et al., 2002: A comprehensive set of climate scenarios for Europe. *In preparation*

3 Resolution

The data is supplied on a 10' grid, covering European land only. The boundaries lie at 11 degrees west, 32 degrees east, 34 degrees north, 72 degrees north. The grid has 258 boxes on the longitudinal axis and 228 boxes on the latitudinal axis. Data is only supplied for land boxes on the grid, which total 31143.

The data is supplied at a monthly time-step for 1901-2100.

4 Scenarios

In total there are 17 scenarios: one natural variability scenario and 16 climate change scenarios. The natural variability scenario is simply the observations for 1901-2000 with the global warming trend removed,[2] repeated for the period 2001-2100. The climate change scenarios are made up of:

- the observations (1901-2000);[3]
- all permutations of four GCMs (HadCM3, CSIRO2, CGCM2, PCM)[4] with four SRES[5] scenarios (A1FI, A2, B1, B2).[6]

Wherever possible, all scenarios should be employed on an equal basis. Where this is not possible, the scenarios should be given the priorities indicated in the table below. (This table has not yet been finalised, except where entries have been made. This table should be finalised very shortly.)

	PCM	CGCM2	CSIRO2	HadCM3
A1FI				
A2				high
B2				
B1				

[2]The data files are named `ateam.iavar.1901-2000.[var]`

[3]The data files are named `obs.1901-2000.[var]`

[4]These are state-of-the-art coupled climate models. A summary of their features may be found in Working Group One's contribution to the IPCC's Third Assessment Report; see tables 8.1 and 9.1: these four models are numbers 23, 10, 7, 30 respectively.

[5]For details of SRES, see the IPCC's Special Report on Emissions Scenarios.

[6]The data files are named `[SRES].[GCM].2001-2100.[var]`

To assist in interpreting the results from any scenario analysis, we supply the details of construction and comprehensive plots in a further set of documents. The differences between the 21st century scenarios arise from one of two sources:

1. the time-series of global temperature change, documented in `sres-globalt.pdf`;
2. the pattern of anthropogenic climate change, documented in `[GCM]-[SRES].pdf`;

5 Observations

The observations (1901-2000) were constructed as follows:

1. The CRU[7] databases were augmented.
2. The existing time-series on the 0.5 degree grid (CRU TS 1.1) were updated to 2000 for Europe (CRU TS 1.2).
3. The existing 1961-90 climatologies on the 10' grid (CRU CL 2.1) were augmented with cloud cover and vapour pressure (CRU CL 2.2).
4. The CRU TS 1.2 data-set was interpolated, as anomalies relative to 1961-90, onto the 10' grid over Europe.
5. The results from (4) were combined with CRU CL 2.2 to obtain the observations (1901-2000).

6 Natural variability scenario

The 20th century in the natural variability scenario was constructed by detrending the observations against global temperature. The 21st century is simply a replica of the 20th century.

[7]Climatic Research Unit, University of East Anglia, UK. See `www.cru.uea.ac.uk`

7 Climate change scenarios

The 21st century in the climate change scenarios was constructed as described below. For any particular variable (v), GCM (g), and SRES scenario (s), the value (x) at a particular grid-box (i) in a particular year (y) and month (m) is:

$$x_{vgsiym} = c_{vim} + r_{viym} + (p_{vgsim} * t_{gsy})$$

where (c) is the observed climatological mean from 1961-90, (r) is the residual from the observations after anomalising relative to 1961-90 and detrending against global temperature, (p) is the pattern of response to radiative forcing (expressed as anomalies relative to 1961-90, per degree of global temperature change), and (t) is the global temperature change (relative to 1961-90).