

CRU Research Archive

1998-2005

Understanding and dissemination

[The Tiempo Climate Cyberlibrary](#) is an electronic information service covering global warming, climate change, sea-level rise and related issues. The Cyberlibrary provides access to authoritative news, views, briefing materials, publications, data, analysis tools and educational resources on the subject of climate change, with particular reference to the situation of the developing world.

The Blueprint Project. A project that generated a Work Plan (or blueprint) for the development of Integrated Assessment Modelling (IAM) for climate change and related impacts, adaptations and mitigation strategies. This project was carried out on behalf of the Tyndall Centre for Climate Change Research, and involved collaborators from nine academic institutions in the UK.

Grant: £158,223 from Tyndall Centre for Climate Change Research (1 Apr 2001 - 31 May 2002), PI: Dr J. Palutikof

Data provision and evaluation

[The Climate Impacts LINK Project](#) was established in 1991 by the UK Department of the Environment, Food and Rural Affairs (DEFRA), formerly the Department of the Environment, to supply datasets constructed from the Hadley Centre's climate change experiments to the international climate change research community. These datasets are accompanied by supporting scientific and technical advice.

Grant: £207,109 from Dept of Environment, Transport & the Regions (1 Dec 2000 - 30 Nov 2002), PIs: Dr D. Viner, Dr M. Hulme

ECLAT-2. This Concerted Action Initiative (CAI) ran for three years from July 1998. The first objective was to improve the understanding and application of results from climate model experiments in EU climate change impacts research projects. The second was to keep European impacts researchers abreast of developments in climate modelling and informed about the availability of results from new climate change experiments performed in Europe and worldwide. These two objectives were achieved primarily through a series of four workshops. The reports from these workshops are available.

Grant: £155,563 from Council of the European Community (1 Jul 1998 - 31 Dec 2001), PIs: Dr M. Hulme, Dr D. Viner

[IPCC Data Distribution Centre.](#) The IPCC established the Data Distribution Centre to facilitate the rapid uptake of more recent climate change science by researchers in the impacts community, and improved consistency in the scenarios adopted in different assessments. Enhanced compatibility between impacts studies is of great importance when evaluating and synthesising results across regions and sectors, and this was a major goal of Working Group II of the IPCC for its Third Assessment Report (TAR).

Instrumental and palaeo data analyses

HIHOL was a joint PAGES, NSF and SCAR funded initiative that aimed to provide an up-to-date picture of High-resolution climate variability in the Holocene and its links with potential climate forcings, against a background of longer-timescale changes during the last 8-9000 years.

Grant: £3,462 from Council of the European Community (1 Nov 1998 - 30 Jun 2001), PI: Prof K.R. Briffa

The HOLSMEER project aimed to produce high-resolution (annual to decadal) climate variability data over the past 2000 years, using shallow marine records from the European Atlantic coastal shelf. These data were then validated and used, first, to extrapolate back using marine proxy records and, second, validated

numerical models of the climate system.

Grant: £99,492 from Council of the European Community (1 Jan 2001 - 31 Dec 2003), PIs: Prof P.D. Jones, Prof K.R. Briffa

Final Report: Sections 0-3 and Final Report: Sections 5-6

The US Department of Energy supported research to assemble and analyse instrumental and paleoclimatic data for identifying and attempting to understand climate system variations and evaluating GCM simulations. Both aspects provided vital information for the detection and attribution of anthropogenic influences on climate.

Grant: £100,000 from US Dept of Energy (1 May 2001 - 30 Apr 2002), PI: Prof P.D. Jones

[Climate change in the Mediterranean.](#) Changes in the frequency, intensity and duration of rainfall and temperature extremes (such as high rainfall events, droughts and heatwaves) over the second half of the last century, together with their potential causes, were investigated for three Mediterranean study regions: the Iberian Peninsula, Italy and Greece. The extent to which the observed changes are consistent with simulated projections of anthropogenic climate change were also explored.

Grant: £34,660 from Natural Environment Research Council (1 Aug 2001 - 28 Feb 2002), PIs: Prof P.D. Jones, Dr C.M. Goodess

[SO&P](#) ("Simulations, Observations & Palaeoclimatic data: climate variability over the last 500 years") was a research project funded by the European Union and was led by Tim Osborn and Keith Briffa at UEA's Climatic Research Unit. The project simulated the climate of the last 500 years, developed improved reconstructions of the real climate over that period, and compared the two to provide an important test of the climate models and an improved estimate of natural climate variability. This work was then used to better quantify the uncertainty in future climate projections, and re-assessed the detection of unusual climate change in the observations.

Grant: £214,902 from Council of the European Community (1 Nov 2002 - 31 Oct 2005), PIs: Dr T.J. Osborn, Prof K.R. Briffa

[Final Report](#)

EMULATE extended the availability of daily historic records of air pressure measurement over the extratropical Atlantic and Europe (70°-25° N by 70° W-50° E), for the period 1850 to the present. Once the record had been extended, atmospheric circulation patterns were derived and relationships between the circulation, sea-surface temperatures and surface temperature and precipitation patterns across Europe evaluated, and compared with model simulations. Analysis of the relationships strengthened our existing predictive capabilities, particularly in the context of climate change and future occurrence of extreme weather in Europe.

Grant: £134,978 from Council of the European Community (1 Nov 2002 - 31 Oct 2005), PI: Prof P.D. Jones

Final Report

Greenhouse warming and future climates

[STARDEX](#) provided a rigorous and systematic inter-comparison and evaluation of statistical, dynamical and statistical-dynamical downscaling methods for the construction of scenarios of extremes. The more robust techniques were identified and used to produce future scenarios of extremes for European case-study regions for the end of the 21st century. These helped to address the vital question as to whether extremes will occur more frequently in the future.

Grant: £178,812 from Council of the European Community (1 Feb 2002 - 31 July 2005), PI: Dr C.M. Goodess

Final Report

Scenarios of extreme climate events. A project which provided appropriate methods and guidelines for the construction of scenarios of climatic extremes, as required by the Tyndall Centre.

Grant: £68,105 from Tyndall Centre for Climate Change Research (1 Apr 2001 - 31 May 2002), PIs: Dr M. Hulme, Dr T. Osborn, Dr C.M. Goodess, Dr J.P. Palutikof

Final Report

PRUDENCE Climate change was expected to affect the frequency and magnitude of extreme weather events, due to higher temperatures, an intensified hydrological cycle and/or more vigorous atmospheric motions. A major limitation in previous studies of extremes has been the lack of:

- appropriate computational resolution - obscures or precludes analysis of the events;
- long-term climate model integrations - drastically reduces their statistical significance;
- co-ordination between modelling groups - limits the ability to compare different studies.

These three issues were all thoroughly addressed in PRUDENCE, state-of-the-art high resolution climate models were used, the project goals to address critical aspects of uncertainty were coordinated, and impact models and impact assessment methodologies were applied to provide the link between the provision of climate information and its likely application to serve the needs of European society and economy.

Grant: £70,364 from Council of the European Community (1 Nov 2001 - 31 Oct 2004), PI: Dr J.P. Palutikof

[Final Report](#)

Impacts of climate change

CLIWOC realised the scientific potential of logbook climatic data and produced a database of daily weather observations for the world's oceans between 1750 and 1850. On completion of the project in 2004 this database was made freely available to the scientific community.

Grant: £26,809 from Council of the European Community (1 Dec 2000 - 30 Nov 2003), PI: Prof P.D. Jones

[Final Report](#)

The Storms Project. A project funded by the Tyndall Centre which analysed potential changes in windstorm occurrence over the North Atlantic and Europe as a result of greenhouse gas-induced climate change. The impacts on two areas of economic activity, forestry and insurance, were explored. The interrelationships with decision-making at both the policy and the operational scale were examined.

Grant: £97,778 from Tyndall Centre for Climate Change Research (1 Apr 2001 - 31 Dec 2003), PIs: Dr J.P. Palutikof, Prof T.D. Davies, Dr T. Osborn

[Final Report](#)

Climate change and the built environment. A project funded by the Tyndall Centre and was carried out in collaboration with the University of Manchester Institute of Science and Technology (UMIST). Regional climate change in the UK was explored with particular reference to the occurrence of extreme events, and the impact these extremes may have on building design and heating and cooling plant.

Grant: £39,255 from Natural Environment Research Council (1 Apr 2001 - 31 Aug 2002), PIs: Prof P.D. Jones, Dr J.P. Palutikof, Dr T. Osborn

[Final Report](#)

SWURVE was a study of the impacts of climate variability and change on the sustainable use of water and its related activities in Europe. A case study approach was used, taking examples of water use from European countries including the Netherlands, Switzerland, Portugal and the UK.

Grant: £123,600 from Council of the European Community (1 Dec 2000 - 30 Nov 2003), PI: Prof P.D. Jones

[Final Report](#)

MICE sought to identify likely changes in extremes of rainfall, temperature, and windstorm under global warming, using forecasts from numerical models. We studied the impacts of those changes on selected European environments. The research also evaluated the capacity of global climate models to reproduce occurrences of extremes, model output with observations were compared. Throughout the project, a continued dialogue with stakeholders and end-users ensured that the research addressed the concerns of

modern society.

Grant: £176,683 from Council of the European Community (1 Jan 2002 - 31 Dec 2004), PI: Dr J.P. Palutikof

Final Report

[BETWIXT](#) and [CRANIUM](#) were part of the Building Knowledge for a Changing Climate (BKCC) research programme funded by EPSRC and managed by UKCIP. BETWIXT developed high spatial and temporal resolution scenarios for the built environment consistent with UKCIP02. CRANIUM constructed the first probabilistic projections of changes in extreme weather events for UK station locations.

Grant: £69,125 from Engineering and Physical Sciences Research Council (1 Apr 2003 - 31 May 2005), PIs: Prof P.D. Jones, Dr C.M. Goodess

[BKCC Final Report](#)

Applications of climate information

Extreme weather over Northern Europe: the TSUNAMI Project explored the potential for seasonal forecasting of wind storm and flood, on behalf of the insurance industry.

Grant: £61,498 from Natural Environment Research Council (1 Sep 1999 - 31 Mar 2002), PIs: Dr J.P. Palutikof, Prof T.D. Davies, Dr T Osborn

CLIMAG. A project which optimised and harmonised effort to reduce food insecurity and vulnerability in Sudano-Sahelian West Africa. The role of CRU was to evaluate seasonal forecasting techniques for rainfall in the region.

Grant: £15,000 from Council of the European Community (1 Mar 2001 - 31 Aug 2003), PI: Dr J.P. Palutikof

[BIOCLIM.](#) An EU-funded project which modelled sequential biosphere states under climate change over very long time scales relevant to the disposal of radioactive waste. The role of CRU was to generate downscaled scenarios of climate for potential repository sites up to 106 years into the future.

Grant: £40,733 from Council of the European Community (1 Oct 2000 - 30 Sep 2003), PIs: Dr C.M. Goodess, Dr J.P. Palutikof

[Final Report](#)

The **POWER** project aimed to assess the offshore wind power potential in European Union waters, taking into account coastal effects and highlighted those sea areas where hazardous wind or wave conditions existed. These estimates could then be used to pinpoint areas that were favourable for siting a wind farm. More detailed monitoring could then be undertaken to improve the initial wind power estimates at a selected site.

Grant: £66,050 from Council of the European Community (1 Aug 1998 - 31 Jul 2001), PI: Dr J.P. Palutikof

1990s

Understanding and dissemination

Global Warming and Vietnam. A briefing document produced by Sarah Granich, Mick Kelly and Nguyen Huu Ninh in 1993, sponsored by the Stockholm Environment Institute and the Swedish International Development Authority.

Data provision and evaluation

[Data sets for 'missing carbon' project.](#) CRU collaborated in a U.K. Natural Environment Research Council (NERC) funded project, aimed at evaluating the influence of 20th century climate variability on the terrestrial carbon cycle. The role of the Unit was principally to develop appropriate data sets, which are now

publicly available at low cost. See details of [project background](#) and [the data sets](#).

Instrumental and palaeo data analyses

The ADVANCE-10K project focused on the area of dendroclimatology. The absolute dating control and seasonal growth of long tree-ring chronologies were used to reconstruct a range of climate variables in different regions of northern Eurasia, in order to enhance our knowledge of natural climate variability on a range of timescales within the last 10,000 years and to advance our understanding of the mechanisms and forcings that have generated this variability.

[The ADVICE project](#) had two main goals. The first was to characterize climate variability over greater Europe, including Iceland, the Near East, and parts of North Africa, over the last 215 years. Historical instrumental data were used to identify months with anomalous circulation between 1780 and 1860, and to reconstruct these months as daily-scale synoptic charts. ADVICE characterized "pre-industrial" climate variability, as a measure of the background noise of natural climate variability, against which any anthropogenic global change signal must be detected. The second goal was to reconstruct climate during the Late Maunder Minimum (LMM), from 1675-1715, using documentary sources. The Late Maunder Minimum is a time of known climatic variability over Europe.

The IMPROVE project undertook an integrated, comparative assessment of the correction and homogenisation protocols for early daily instrumental meteorological records (starting in the early/mid-eighteenth Century). Daily temperature and pressure series were produced for sites such as Padova (from 1725), Milan (from 1763), San Fernando/Cadiz (from 1776), Brussels (from 1767), Uppsala (from 1722), and Stockholm (from 1754).

Modelling and processes of climate change

Climate change and sea level. The objective was to advance research into the basic processes that contribute to changes in the ocean volume with a changing climate. This involves the atmosphere, the oceans, and the continental ice masses. There are four main contributors to sea level rise: thermal expansion, glacier and small ice cap melt, the Greenland ice sheet and the Antarctic ice sheet. The project investigated each of these individually. Finally, modelled projections of global temperature change and sea level rise were performed.

[MAGICC](#) is a simple upwelling-diffusion energy balance model designed to assess the global-mean temperature and sea level changes that might arise from future emissions of greenhouse gases and of non-greenhouse gases that affect the lifetime of methane and of sulphur dioxide. It was used in the Third Assessment Report of the Inter-governmental Panel on Climate Change ([IPCC TAR](#)). The Technical Summary for Policymakers is [available](#), and an example of the use of MAGICC can be seen in Figure 22.

[SCENGEN](#) generates global and regional scenarios of climate change based on global climate model (GCM) experimental results of the users' choosing. As a stand-alone module, SCENGEN is driven by in-built global-mean temperature projections derived from two greenhouse gas emissions scenarios. SCENGEN can also be used in conjunction with MAGICC to generate a much wider range of global warming projections.

[SPECTRE](#) allows the user to generate a range of climate change scenarios specifically for the UK. Initially, a greenhouse gas emissions scenario has to be chosen from a pre-defined set of nine such scenarios. The global warming and carbon dioxide concentration projections for each scenario have been derived from MAGICC. These global warming projections are linked to results from nine different GCM experiments to generate patterns of climate change over the UK. Options exist to select scenarios based either on single

GCMs or on a group of GCMs. Estimates of the changes in daily temperature extremes and degree days for nine sites in the UK can also be generated.

Greenhouse warming and future climates

[The ACCORD project](#) objectives were to evaluate existing methodologies for classifying atmospheric circulation patterns, to automate them and to develop new automated schemes. These automated schemes were used to explore climatic variability since the late nineteenth century. The importance of the North Atlantic Oscillation was explored with respect to the variability of surface temperature and precipitation across Europe, and particularly the recent increases in precipitation in many regions of northwest Europe. Finally, efforts were devoted to improving the potential of the circulation classification approach for downscaling.

Impacts of climate change

MEDALUS. An international research project to investigate the effects of desertification on land use, and hence on economies and societies, in Mediterranean Europe. See also the [main MEDALUS project webpage](#).

The WISE project performed empirical studies of the impacts of climatic variability, in particular hot summers, warm winters and wind storms, on natural, social and economic systems in Europe. The intention was to enhance understanding of the likely impacts of future climate change.

[The WRINCLE project](#) assessed the impacts on European water resources of climate change and variability, and used the latest atmospheric model outputs to generate climate change scenarios for the future.