European and North Atlantic daily to MULtidecadal climate varaibility

EMULATE

EVK2-CT-2001-00161

Final project report: November 2002 to February 2006

Section 5: Executive publishable summary related to the overall project duration

Co-ordinator: Professor Phil Jones (p.jones@uea.ac.uk)
Climatic Research Unit, University of East Anglia,
Norwich, NR4 7TJ, UK

EMULATE home page: http://www.cru.uea.ac.uk/projects/emulate/

SECTION 5: Executive publishable summary, related to the overall project duration

Written by the Co-ordinator, less than 2 pages

Contract n°	EVK2-CT-2002-00161	Project Duration:	3.2 years: November 2003 to February 2006
Title	European and North Atlantic daily to MULtidecadal climATE variability: EMULATE		

Objectives:

- Create daily gridded MSLP fields from 1850
- Derive a set of characteristic atmospheric circulation patterns, and study their variations and trends for each season
- Relate variations and trends in atmospheric circulation and associated surface climate variability over Europe to sea surface temperature patterns, particularly from the North Atlantic
- Relate variations and trends in atmospheric circulation patterns to prominent extremes in temperature and precipitation

Scientific achievements:

Based on extensive analyses of both observed and modelled data, EMULATE has demonstrated that:

- Consistent circulation types can be developed from the observational data base and these same types are well simulated by climate models.

- Temperature extremes across Europe are changing, although not in a consistent way across the whole continent nor similarly for all aspects of the distribution. Changes in precipitation extremes are less coherent, but more locations show increases in heavy precipitation events

- Patterns of changes in the circulation types and extremes (including drought) can be related to sea surface temperature patterns and the major patterns of circulation variability such as the North Atlantic Oscillation

Main deliverables:

As well as detailed technical reports and journal papers, EMULATE has produced a number of important datasets. These include: a daily gridded dataset of sea-level pressure (25ºN to 70ºN; 70ºW to 50ºE on a 5º by 5º grid spacing from 1850); daily circulation classifications into objective weather types using 3 methods; daily station datasets of temperature and precipitation, together with an array of extreme indices for the traditional seasons and for 2-month 'seasons'; and a large number of climate model integrations.

Socio-economic relevance and policy implications:

The analysis of extremes has used the most station data and associated indices yet compiled, so providing the most spatially complete study for Europe. The ability of the climate model to simulate most of the observed features of extremes and circulation variability, should improve the credibility of the model for climate predictions in coming decades. The many extreme indices

developed should prove very useful to stakeholders and other climate scientists. Some of the initial work in the project was completed in time to be referred to in the upcoming 2007 IPCC report.

Conclusions:

EMULATE has shown how the circulation has a strong influence on daily surface temperature and precipitation patterns across Europe, and how well these features are simulated by a state-of-the-art climate model. EMULATE has also developed a number of important datasets, which when they become more widely known, will be extensively used in the future.

Dissemination of results:

The EMULATE web site (http://www.cru.uea.ac.uk/cru/projects/emulate) provides access to a wide range of information on the project, including all publicly-available report and data deliverables. Project outputs have also been disseminated via presentations at scientific conferences and peer-reviewed journal papers.

Keywords: Climate change, Pressure, Circulation typing, Temperature, Rainfall, Extreme events, Climate Models