
Preface

Climate change not only includes changes in mean conditions, but also covers changes in extremes. For impact on society, extreme climatic conditions are often much more important than mean climate. Thus adaptation to climate change needs to take historical changes in the extreme climatic conditions into account. Europe is one of a few places in the world where the longest instrumental meteorological records exist, which provides an important opportunity to reveal long term changes in the extremes. Over the past decade, several research projects at the European level have dealt with changes in extreme climatic conditions in Europe.

One of these projects is EMULATE (European and North Atlantic daily to MULTidecadal climATE variability) that was supported by the European Commission under the Fifth Framework Programme. The project contributed to the implementation of the Key Action “Global change, climate and biodiversity” within the Environment, Energy and Sustainable Development. It was coordinated by Prof. Phil Jones, Climatic Research Unit at the University of East Anglia, UK and had eight participating institutions across Europe. One of the outcomes of the EMULATE project was a systematic mapping of the observed trends of 64 temperature and precipitation indices based on daily instrumental records in Europe. The majority of the indices describe extreme climatic conditions.

In 2006, this systematic mapping was published as an internal report at the University of Gothenburg, which was one of the participating organizations of EMULATE. However, given the nature of the report, the accessibility is limited. Over recent years, needs for information about past changes in extreme climatic conditions have significantly increased. This is particularly true for really extreme conditions and for extended time perspectives. This in 2012, the authors of the report decided to publish an atlas of those indices that represent the most extreme conditions of climate in Europe. This idea resulted in an atlas attempting to show a subset of all the EMULATE indices to a much wider audience than the internal report does.

This atlas presents information in the form of maps, time series and tables for a selection of 27 indices. Four of them represent mean climate conditions while the remaining indices represent climate extremes. All indices were derived from daily temperature and precipitation data at European meteorological stations with records starting before 1901. Since the updating of the daily records for the stations after 2000 has not been finished, this atlas was prepared by using the trends only until 2000 for all the stations. Seasonal trends of the indices during three periods (1801–2000, 1851–2000, and 1901–2000) were shown and their significance was tested. The stations for 1901–2000 were also grouped into three regions (Northern, Central, and Southern Europe) and regional means were calculated. The trend which this atlas provides is an easy way to show spatial patterns for a given time period, region, season, and index. There is strong evidence that climate in Europe has changed during the three periods analyzed, such that the occurrence and intensity of warm temperature extremes have increased. Precipitation extremes have also changed, but with a less clear pattern compared to the temperature extremes.

The atlas should be interesting to and useful for researchers who are from or interested in Earth and Environmental Sciences and practitioners from many sectors in society who are concerned with climate changes in the mean and extreme conditions in Europe.

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