

## HOMOGENEITY ADJUSTMENTS OF *IN SITU* ATMOSPHERIC CLIMATE DATA: A REVIEW

THOMAS C. PETERSON<sup>a,\*</sup>, DAVID R. EASTERLING<sup>a</sup>, THOMAS R. KARL<sup>a</sup>, PAVEL GROISMAN<sup>a</sup>, NEVILLE NICHOLLS<sup>b</sup>, NEIL PLUMMER<sup>b</sup>, SIMON TOROK<sup>c</sup>, INGEBOURG AUER<sup>d</sup>, REINHARD BOEHM<sup>d</sup>, DONALD GULLETT<sup>c</sup>, LUCIE VINCENT<sup>e</sup>, RAINO HEINO<sup>f</sup>, HEIKKI TUOMENVIRTA<sup>f</sup>, OLIVIER MESTRE<sup>g</sup>, TAMÁS SZENTIMREY<sup>h</sup>, JAMES SALINGER<sup>i</sup>, EIRIK J. FØRLAND<sup>j</sup>, INGER HANSSSEN-BAUER<sup>j</sup>, HANS ALEXANDERSSON<sup>k</sup>, PHILIP JONES<sup>l</sup> and DAVID PARKER<sup>m</sup>

<sup>a</sup> National Climatic Data Center, NOAA, 151 Patton Avenue, Asheville, NC 28801, USA

<sup>b</sup> Bureau of Meteorology, Melbourne, Victoria, Australia

<sup>c</sup> School of Earth Sciences, University of Melbourne, Melbourne, Victoria, Australia

<sup>d</sup> Central Institute of Meteorology and Geodynamics, Vienna, Austria

<sup>e</sup> Climate Research Branch, Environment Canada, Downsview, Ontario, Canada

<sup>f</sup> Finnish Meteorological Institute, Helsinki, Finland

<sup>g</sup> Météo France, SCEM/CBD, Toulouse, France

<sup>h</sup> Hungarian Meteorological Service, Budapest, Hungary

<sup>i</sup> National Institute of Water and Atmospheric Research Ltd., Auckland, New Zealand

<sup>j</sup> Norwegian Meteorological Institute, Oslo, Norway

<sup>k</sup> Swedish Meteorological and Hydrological Institute, Norrköping, Sweden

<sup>l</sup> Climate Research Unit, University of East Anglia, Norwich, UK

<sup>m</sup> Hadley Centre, Meteorological Office, Berkshire, UK

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### ABSTRACT

Long-term *in situ* observations are widely used in a variety of climate analyses. Unfortunately, most decade- to century-scale time series of atmospheric data have been adversely impacted by inhomogeneities caused by, for example, changes in instrumentation, station moves, changes in the local environment such as urbanization, or the introduction of different observing practices like a new formula for calculating mean daily temperature or different observation times. If these inhomogeneities are not accounted for properly, the results of climate analyses using these data can be erroneous. Over the last decade, many climatologists have put a great deal of effort into developing techniques to identify inhomogeneities and adjust climatic time series to compensate for the biases produced by the inhomogeneities. It is important for users of homogeneity-adjusted data to understand how the data were adjusted and what impacts these adjustments are likely to make on their analyses. And it is important for developers of homogeneity-adjusted data sets to compare readily the different techniques most commonly used today. Therefore, this paper reviews the methods and techniques developed for homogeneity adjustments and describes many different approaches and philosophies involved in adjusting *in situ* climate data. © 1998 Royal Meteorological Society.

KEY WORDS: homogeneity; climate data; data adjustment techniques; metadata

### 1. INTRODUCTION

Climate data can provide a great deal of information about the atmospheric environment that impacts almost all aspects of human endeavour. For example, these data have been used to determine where to build homes by calculating the return periods of large floods, whether the length of the frost-free growing season in a region is increasing or decreasing, and the potential variability in demand for heating fuels. However, for these and other long-term climate analyses—particularly climate change analyses—to be accurate, the climate data used must be homogeneous. A homogeneous climate time series is defined as one where variations are caused only by variations in weather and climate (Conrad and Pollak, 1950).

\* Correspondence to: National Climatic Data Center, NOAA, 151 Patton Avenue, Asheville, NC 28801, USA.