

## Construction of a 10-min-gridded precipitation data set for the Greater Alpine Region for 1800–2003

Dimitrios Efthymiadis,<sup>1</sup> Philip D. Jones,<sup>1</sup> Keith R. Briffa,<sup>1</sup> Ingeborg Auer,<sup>2</sup> Reinhard Böhm,<sup>2</sup> Wolfgang Schönner,<sup>2</sup> Christoph Frei,<sup>3</sup> and Jürg Schmidli<sup>4</sup>

Received 22 April 2005; revised 4 August 2005; accepted 20 October 2005; published 13 January 2006.

[1] A new precipitation data set for the Greater Alpine Region (GAR; 4°E–19°E, 43°N–49°N) has been developed. It provides monthly precipitation totals, for the 1800–2003 period, gridded at 10-min resolution. The new HISTALP 10-min-grid data set is based on 192 long-term homogenized precipitation series from meteorological stations across the study domain and a high-resolution precipitation climatology for the 1971–1990 period. The effective coverage of the data set depends on the observations available in the station network which progressively declines back to the early 19th century (from 192 to 5 stations). To aid the use of these data in other studies, an accompanying data set has also been developed, which provides a measure of the quality of each monthly precipitation estimate over the grid: the explained variance, relative to the 1931–2000 (maximum data availability) period. The computed quality score illustrates the comparatively poorer accuracy of the data set for regions and months with less coherent precipitation fields (i.e., over the Alps and in summer) and when the number of stations is reduced, particularly before 1840. The derived gridded field has also been compared for the whole and geographical subregions with other independently developed data sets and is found to provide a similar description of the precipitation in the GAR for places and periods of common coverage. The data set is publicly available at <http://www.cru.uea.ac.uk/>.

**Citation:** Efthymiadis, D., P. D. Jones, K. R. Briffa, I. Auer, R. Böhm, W. Schönner, C. Frei, and J. Schmidli (2006), Construction of a 10-min-gridded precipitation data set for the Greater Alpine Region for 1800–2003, *J. Geophys. Res.*, *111*, D01105, doi:10.1029/2005JD006120.

### 1. Introduction

[2] The precipitation field of the European Alps is perhaps both the best observed and most studied among the topographically and climatically complex regions of the Earth. A comprehensive listing of the many studies can be found in *Frei and Schär* [1998]. These studies have benefited from a network of meteorological stations, which operated in the area with its maximum density during the second half of the 20th century. This network enabled the construction of gridded climatologies and multidecadal data sets with grid resolution of ~100 m to ~100 km, at a daily to annual temporal resolution (see Table 1). The construction of these data sets was carried out either for individual national territories, or trans-national domains, and in some cases were part of global-scale studies. None of the gridded data

sets constructed to date, however, extends before 1901 constraining the length and timescale of climatic variations that can be considered.

[3] A multicentury description of precipitation is necessary to achieve an extended understanding of the climate variability in the Greater Alpine Region (GAR, 4–19°E, 43–49°N; see Figure 1) with particular emphasis on its long-term components. This need has recently led to the development of meteorological records from various international, national and subnational instrumental data collections and the construction of a new data set with long-term, homogenized time series of monthly precipitation totals for 192 sites in the GAR [*Auer et al.*, 2005]. A few of the time series extend back to 1800, whereas most of them start within the 19th century. Complete data coverage is provided from 1927 to 2003. This data set is part of a general climatic database in development, named “HISTALP”, which comprises instrumental monthly climate time series for the realm of the European Alps. Its development began in the early 1990s with single long-term variable data sets for Austria (e.g., *Böhm* [1992] for temperature; *Auer* [1993] for precipitation). Later, *Auer et al.* [2001a] developed a multiple Austrian data set for 9 climate variables. Since then, intensification of the collaboration of all climate data providers for the region has allowed an extension to the

<sup>1</sup>Climatic Research Unit, School of Environmental Sciences, University of East Anglia, Norwich, UK.

<sup>2</sup>Central Institute for Meteorology and Geodynamics, Vienna, Austria.

<sup>3</sup>MeteoSwiss, Zurich, Switzerland.

<sup>4</sup>Institute for Atmospheric and Climate Science, ETH, Zurich, Switzerland.