An Introduction to HISTALP

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INTRODUCTION

ZAMG's climate variability working group has created a **comprehensive** (several hundred single series), **multiple** (7 climate elements), **long** (longest series back to 1760), **quality improved** (thousands of inhomogeneities and incorrect outliers removed) and **completed** (original gap rate 5%) dataset of monthly instrumental climate time-series in the "Greater Alpine Region" (GAR, 4°-19°E, 43 °-49d°N). Data were collected from approximately 20 providers of the 10 countries in the region. The creation of HISTALP was partly funded by several national and international projects and is maintained by ZAMG with the support from the data providers as a quality orientated climate monitoring activity. Homogenisation and the implementation of major improvements take place about every 5 years.

The data is kept in three different modes: **station mode** (single station series, original and homogenised), in **CRSM-mode** (coarse resolution subregional mean anomalies for 5 objectively regionalised main subregions) and in **grid-modes**.

Unrestricted access to the data is given on the webpage: **www.zamg.ac.at/histalp**

1. STATION MODE

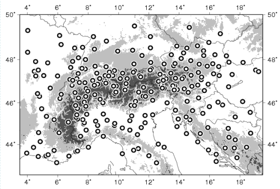


Fig.1: Map of the „Greater Alpine Region" (GAR) with the complete network of stmod-hom sites

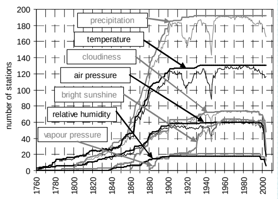
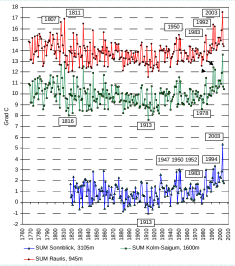


Fig.2: Evolution of the stmod-series of five main climate elements 1760-2003

All station mode series (Fig.1) are present in the dataset as stmod-ori (with gaps, inhomogeneities and outliers) and as stmod-hom (detected breaks and outliers removed, gaps filled). The collected parameters are temperature, precipitation, pressure, sunshine duration, cloudiness, relative humidity and vapour pressure (Fig.2). Since 2008 the systematic bias in temperature due to early instrumentation (Böhm et al. 2010) is corrected. (Fig.3)

Fig.3: Example 2: Summer temperatures 1768-2005 in the Central Alps (same vertical profile as Fig.3). The series are a blend of stmod-hom and CRSM (for CRSM compare section 2 of this poster)



2. CRSM-MODE

(ANOMALIES TO 20TH CENTURY MEAN, 5 SUBREGIONS)

A regionalization of the GAR (Fig. 5) based on PCA (for details see Auer et al., 2007) for each of the five leading climate elements (temperature, precipitation, pressure, cloudiness and sunshine) resulted in similar principal subregions. The advantage of the common subregions is to allow direct comparisons of different climate elements by representative CRSM-series (coarse resolution subregional mean series). The 5th CRS consists of the high elevation mountains (not displayed here).

Figs. 4 and 5 show some examples of CRSM-series in the more conventional way of single year- and low pass filtered series.

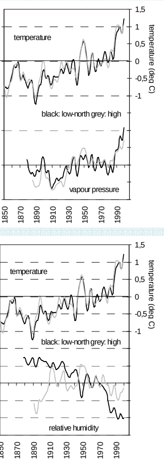


Fig.4: Temperature- and humidity evolution (20 years lowpass) in the CRSM regions "North" and "High-elevation". Vapour pressure closely mimics temperature whereas relative humidity remains stable in the warming high elevation atmosphere but decreases in the lowlands

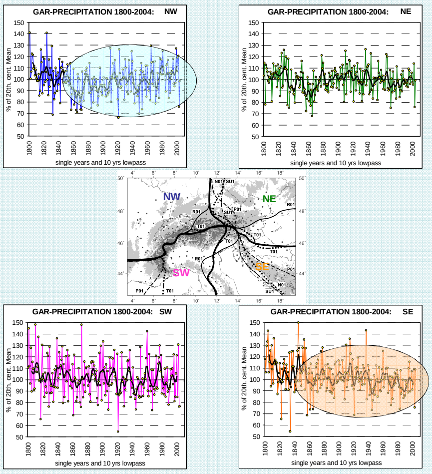


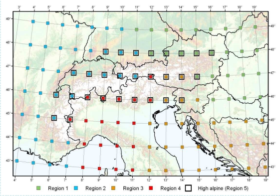
Fig.5: Four CRSM-precipitation series (annual, 1800-2004) showing the different evolutions in the four low elevation CRSs. Remarkable are the contrary long-term trends of subregions NW and SE, marked in blue (NW-increasing) and in orange (SE-decreasing).
The middle plot shows the homogeneous climate subregions for the different climate elements (thin lines) and the compromise for all elements (bold line)

3. GRID-MODES

For three climate elements (air pressure, air temperature and precipitation) different grids have been prepared.

2 different resolutions are available: 1° and 5 arcmin, with varying parameters. Different orographically modified inverse distance interpolations were used to create the grids. Details are given in Auer et al., 2007, Efthymiadis et al.2006, Hiebl et al.2009, Chimani et al, 2011)

Fig. 6 The two grid-1 nets for temperature (high and low elevation)



The **1° grids** (Fig. 6) contain monthly **anomaly** series for all 3 parameters. For air pressure, only series <600m asl. have been used, for temperature gridding was performed separately for <1500m and >1500m asl., for precipitation, all series were used (but summit sites are not present in the stmod-dataset already, due to insurmountable measuring problems there).

The **5' grids** (Fig.7) are available for **absolute** temperature, precipitation and solid precipitation. While the beginning for the available timeseries is not the same for each grid point of the 1°-grid, it is the same in the 5' grid. To achieve this goal for temperature, reconstruction of missing data back to 1780 was done using EOFs on the station data anomalies. Absolute values are calculated by blending the anomaly analysis with high resolution climate means (Hiebl et al. 2009) .For precipitation a refinement of the monthly precipitation data of Efthymiadis (Efthymiadis et al. 2006) was done.

Solid precipitation is the result of an temperature depending approximation for the percentage of solid precipitation and the precipitation amount.

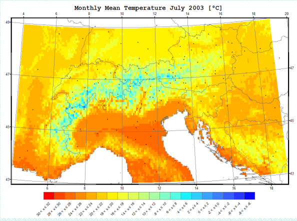
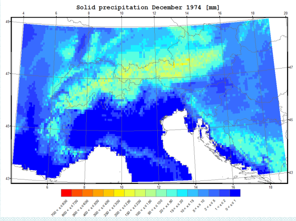


Fig.7: Examples for 5' grid analyses. Left: absolute temperature in July 2003, right: amount of solid precipitation in December 1974



4. HISTALP-NEWSLETTERS

In seasonal and annual intervals a HISTALP Newsletter is produced, giving information on the recent timespan, embedded into the longterm CRSM-series. As a near realtime update for the international data is not practicable the Newsletter contains only information about the Austrian part of the GAR so far..

In Fig.8 examples of the information given in the Newsletter for Spring 2011 are given.

The Newsletter (only German version available) can be downloaded from http://www.zamg.ac.at/klima/Klimawandel/Aktuelles/

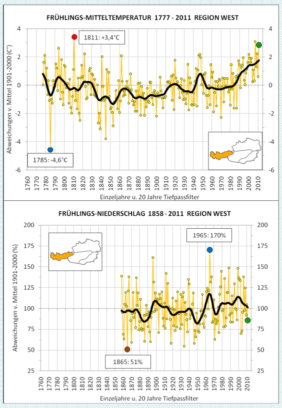


Fig. 8 Mean temperature anomaly (upper graph) and precipitation sum anomaly (lower graph) of spring 2011 to the longterm mean of 1901-2000 (orange line) for the western part of Austria (see plot in the lower right/upper left corner for location),
Green point: spring 2011, red point: warmest /driest spring, blue spot: coldest /wettest spring, black line: 20 year running mean

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More information:

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Some data is not available via the Histalp-Homepage! Feel free to ask for those additional data! We will be glad to assist you.

Acknowledgement: HISTALP was developed and systematically implied under the umbrella of the Austrian nationally funded project CLIVALP (Austrian FWF, P16076-N06). Further support came from a number of national and international projects ALPCLIM (EU, ENV4-CT97-06389), ALP-IMP (EU, EVK2-CT-2002-00148), ALOCLIM (GZ. 308.938/3-IV/B3/96, CLIMAGRI (DM 484/7303/2000; DM 337/7303/2002; DM 639/7303/2003, e 504/7303/2000), CNR Special Project "Reconstruction of the Past Climate in the Mediterranean area" (02-02/05/97-037681), the Swiss Projects KLIMA90 and NORM 90, the Italian Meteorological Society project CLIMOVEST (Fondazione CRT) and the DHMZ and the Croatian Ministry of Science Project "Climate Variability and Change and Their Impacts" (0004003/2003).

We particularly acknowledge the friendly formal and informal cooperation with the data providers in the Greater Alpine Region.