



## **The integration of the automatic foehn index into the longest time series for foehn (starting 1864 for Altdorf, Switzerland)**

B. Dürr (1), H. Richner (2), Th. Gutermann (3), and S. Bader (4)

(1) Sunergy GmbH, Buchs SG, Switzerland (bruno.duerr@gmail.com), (2) IACETH, Atmosphere and Climate, Zurich, Switzerland (hans.richner@ethz.ch), (3) formerly MeteoSwiss, Zurich (t.gutermann@bluewin.ch), (4) MeteoSwiss, Zurich, Switzerland (stephan.bader@meteoswiss.ch)

For Altdorf Switzerland, foehn events were recorded carefully since 1864. Three times a day - in the morning, at noon and in the evening - observations were made resulting in a "foehn"/"no foehn" information. Since foehn is a very clear event that manifests itself in sudden increases in temperature and wind, and in a simultaneous drop in relative humidity, the data can be regarded as quite reliable. Furthermore, the observations were made by members of the same family for 85 years. The observations were processed to yield a time series consisting of monthly sums for each of the observation time (morning, noon, evening) and year.

Since 1984, data from automatic stations is available. An objective method was developed that allows to determine "foehn"/"no foehn" in 10-minute intervals from which foehn hours can be computed. This foehn index is based on wind direction, wind speed, gust speed, and relative humidity. A further criterion is the difference in potential temperature to the reference station Gütsch (situated on the Alpine ridge). Parallel to the foehn index, "manual" foehn observations at the three observation times were continued until 2008.

As a result, two different foehn time series are available: (i) a series of monthly sums of triple observations for 1864-2008 (morning, noon, evening) and (ii) a series of foehn observations for every single hour since 1984. For the overlap period 1984 to 2008, correlations between the two time series were analyzed and transformation functions determined. These latter allow to either convert the monthly sums of triple observations to foehn hours or vice versa. In both cases, the time resolution is fixed to monthly values for three time slices per day. As result, the climatologically very valuable, 145-year-long time series, can be continued without interruption into the future, allowing further climatological analyses of foehn in Altdorf, either in terms of foehn observations or foehn hours.