

Swiss Climate Change Scenarios CH2011

Local scenarios at daily resolution based on individual model chains

About this dataset (CH2011_daily_local)

Version

Version 1.1, 28 September 2011

Support

info@ch2011.ch

Further documentation

[Full CH2011 report \(pdf\)](#), see Chapter 4.2

Daily scenarios of temperature and precipitation changes at MeteoSwiss observational station sites for each day of the year, for the three scenario periods and individual GCM-RCM model chains. Only the A1B emission scenario is covered.

The dataset provides changes relative to the reference period 1980-2009 for three scenario periods (2021-2050, 2045-2074, 2070-2099) and 10 GCM-RCM model chains at 188 (temperature) and 565 (precipitation) stations in Switzerland.

Data purpose and limitations

The data are intended for use in climate impact studies, particularly for studies about the impact of changes in the mean annual cycle of temperature and precipitation. The data is based on 30-year mean temperature and precipitation changes. It does therefore neither account for potential changes in interannual variability, nor for changes in wet-day frequency or dry-spell length. Thus, the data are generally not suitable for analyses of future extreme events. Any usage beyond the analysis of changes in the mean annual cycle should be critically assessed.

This data set (version 1.1) is very similar to the [Delta Change scenarios for Swiss meteorological stations](#) (version 1.0), which has previously been released within the projects *CCHydro* and *Klimaänderung und Wasserkraftnutzung*. It uses the same GCM-RCMs and the same station set. Small differences in the order of 0.01 °C (for temperature) and 0.01 (for precipitation) occur due to some minor technical differences in the computational method.

Instructions for use

The supplied data represent expected changes in temperature and precipitation and can be used as such. In order to obtain absolute expected temperature and precipitation for the scenario periods, the data needs to be combined with observational time series for the period 1 January 1980 to 31 December 2009. The resulting time series are representative for the expected future climate in the scenario periods as a whole, but not for individual years.

Step 1: Obtain observational data

The observational data for the reference period must be obtained directly from the data owner, e.g., via [IDAWEB by MeteoSwiss](#). Select the desired station and order daily mean air temperature 2 m above ground or calendar day precipitation from 1 January 1980 to 31 December 2009 in CSV data format. Alternatively, there is a [full data package](#) available through the download page.

Step 2: Prepare observational data

Since the supplied climate change data contains information for 365 days, the leap years have to be shortened by one day in the observational data. This is obtained by removing the observations for the 29 February of the leap years.

Step 3: Derive expected future climate data

Each observation belonging to a particular day in the year (e.g., 15 March = day 74) has then to be combined with the value provided in this dataset. Future temperature is derived additively, precipitation multiplicatively.

Temperature (Addition)

Expected future 2-meter temperature for the scenario period (in °C) is obtained by adding the temperature changes provided in this dataset for the corresponding days of the year to the observed time series of 2-meter temperature in the reference period.

Example: If the dataset provides a temperature change of 1.5 °C, and the observation is 19 °C, the expected future temperature amounts to $1.5\text{ °C} + 19\text{ °C} = 20.5\text{ °C}$ (fictitious numbers).

Precipitation (Multiplication)

Expected future precipitation for the scenario period (in mm per day) is obtained by multiplying the precipitation changes provided in this dataset for the corresponding days of the year by the observed time series of precipitation in the reference period.

Example: If the dataset provides a precipitation change of 1.2, and the observation is 8.5 mm per day, the expected future precipitation amounts to $1.2 \times 8.5\text{ mm per day} = 10.2\text{ mm per day}$ (fictitious numbers).

Source data

This dataset was derived from regional climate model data provided by the [ENSEMBLES project](#). 10 model chains, each consisting of one general circulation model (GCM) driving one regional climate model (RCM), were analyzed (see Appendix below). All model chains assume the SRES A1B emission scenario. Differences between the 10 different model chains represent modeling uncertainty.

Technical specifications

File names

The names of the data files follow the convention
CH2011_daily_local_STN_VAR_SCEPERIOD.csv

STN: 3 character station identifier as used in [IDAWEB by MeteoSwiss](#)
VAR: Abbreviation of the variable. T stands for 2-meter temperature , P stands for precipitation.
SCEPERIOD: Scenario period 2035 (= 2021-2050), 2060 (= 2045-2074) or 2085 (= 2070-2099).

File format

CSV: Comma Separated Values, using semicolon as separator.

File structure

Each file contains the additive temperature changes or multiplicative precipitation changes of the model chains for the station site specified via STN in the filename or the station metadata in the file header.

Rows 1-7: Station metadata

Row 9: Data source URL

Row 10: Dataset version number

Rows 12-13: Information on the provided data. It is indicated whether the changes are additive or multiplicative and which reference and scenario period have been used for the estimation

Row 15: Column labels. The first column indicates the day in the year (DIY) to which the provided change corresponds to. The following columns indicate the model chains from which the data was derived. The model chains are named according to the convention INSTITUTION_GCM_RCM.

Rows 16-380: Column-wise listing of the temperature or precipitation changes for each model chain.

How to acknowledge this data set

Publication of any kind, based in whole or in part on this dataset, should include the following: 1. Citation of report "CH2011 (2011), Swiss Climate Change Scenarios 2011, published by C2SM, MeteoSwiss, ETH, NCCR Climate, and OcCC, Zurich, Switzerland, 88pp. ISBN: 978-3-033-03065-7" 2. Citation of publication "Bosshard, T., Kotlarski, S., Ewen, T., Schär, C.: Spectral representation of the annual cycle in the climate change signal, Hydrol. Earth Syst. Sci., 15, 2777-2788, doi: 10.5194/hess-15-2777-2011, 2011." 3. Inclusion of the following acknowledgment: "The CH2011 data were obtained from the Center for Climate Systems Modeling (C2SM)."

Appendix

List of the 10 model chains provided in this dataset

Institute	GCM	RCM
ETHZ	HadCM3Q0	CLM
HC	HadCM3Q0	HadRM3Q0
SMHI	HadCM3Q3	RCA
DMI	ECHAM5	HIRHAM
KNMI	ECHAM5	RACMO
ICTP	ECHAM5	REGCM
MPI	ECHAM5	REMO
SMHI	ECHAM5	RCA
CNRM	ARPEGE	ALADIN
SMHI	BCM	RCA

http://data.c2sm.ethz.ch/dataset/ch2011/daily_local/