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CH2018 - Climate Scenarios for Switzerland

Documentation of the localized CH2018 datasets

Transient daily time series at the local scale: DAILY-LOCAL, DAILY-GRIDDED

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1. Overview

The localized CH2018 datasets consist of transient daily time series for the period 1981 - 2099 for several variables at individual Swiss stations (DAILY-LCOAL) and on a regular 2km grid covering the area of Switzerland (DAILY-GRIDDED). These data are primarily useful for research purposes and are available upon request. They are largely consistent with all further CH2018 data products. The data were produced by applying a statistical bias-correction and downscaling method (Quantile Mapping, QM) to the original output of all EURO-CORDEX climate model simulations employed in CH2018. As observational reference, station observations and observation-based gridded analyses were used. A detailed description of the method and the underlying datasets is provided by the CH2018 Technical Report (CH2018, 2018; Chapter 5) and by Feigenwinter et al. (2018).

2. Available simulations and variables

The CH2018 scenarios are based on the EURO-CORDEX climate projections. These consist of a large number of transient regional climate scenarios carried out by different combinations of global and regional climate models (GCMs, RCMs; see www.euro-cordex.net) and assuming three different greenhouse gas scenarios. In total, the CH2018 scenarios employ 68 EURO-CORDEX simulations (12, 25 and 31 simulations for greenhouse gas scenarios RCP2.6, RCP4.5 and RCP8.5, respectively); see Tables 1 and 2 for an overview. In terms of meteorological variables, the DAILY-LOCAL scenarios cover seven variables while the DAILY-GRIDDED product only covers four of them (see Table 3). The reason for this reduced set is the lack of a gridded observational dataset to serve as reference for the bias correction for the remaining three variables. Note that due to missing EURO-CORDEX RCM output, not all variables can be provided for all simulations. Daily mean temperature (*tas*), daily maximum temperature (*tasmax*), daily minimum temperature (*tasmin*), daily precipitation sum (*pr*) and daily mean surface wind speed (*sfcWind*) are available for all 68 simulations while daily mean relative humidity (*hurs*) and daily mean global radiation (*rsds*) are available for a subset only (see Table 1).

Depending on the variable, the DAILY-LOCAL product is provided for a differing set of stations; see Table 4 for a complete list of available stations and the accompanying file *stations_CH2018_meta.txt* for the respective station meta information (full station name, station location, station elevation, etc.). The largest number of stations (399) can be provided for daily precipitation. The reason for this differing number of stations is the differing availability of observational series in the historical period 1981-2010 that serve as reference for the bias correction. See Chapter 5.2 of CH2018 (2018) for further details on the criteria for station selection.

3. Data formats

Both the DAILY-LOCAL and the DAILY-GRIDDED products are provided in Unidata's NetCDF format (www.unidata.ucar.edu/software/netcdf). For a quick view and for basic data operations in NetCDF we recommend the use of the Climate Data Operators (CDO) tool (www.mpimet.mpg.de/cdo). Additionally, the DAILY-LOCAL scenarios are provided in csv (ASCII) and Rdata (binary data format of the R computing language) format. Here, a brief overview on the file structures, file names and data formats is provided.

DAILY-LOCAL

For a given climate model chain, a given meteorological variable and a given data format the DAILY-LOCAL scenarios are provided as zip files that are named according to the convention

CH2018_[VARIABLE]_[SIMULATION]_QMstations_1981-2099_[FORMAT].zip

where [VARIABLE] is the variable abbreviation according to Table 3, and [SIMULATION] represents the CH2018 simulation name according to Table 1. [FORMAT] is either *netcdf*, *Rdata* or *csv*. As an example, the zip file for daily mean temperature, the simulation CLMCOM-CCLM4_HADGEM_EUR11_RCP45 and the NetCDF format is named

```
CH2018_tas_CLMCOM-CCLM4_HADGEM_EUR11_RCP45_QMstations_1981-2099_netcdf.zip
```

After unzipping the file, the individual data files for all available stations and containing daily series for the entire period 1981-2099 are obtained. These are named following the convention

CH2018_[VARIABLE]_[SIMULATION]_QMstations_1981-2099_[STATION].[FILEFORMAT]

where [STATION] represents the station abbreviation according to Table 4. [FILEFORMAT] is either *nc* (for NetCDF), *csv* (for csv) or *Rdata* (for Rdata). For instance, the data file for daily mean temperature, the simulation CLMCOM-CCLM4_HADGEM_EUR11_RCP45 and the station Zurich/Fluntern (SMA) in NetCDF format is named

```
CH2018_tas_CLMCOM-CCLM4_HADGEM_EUR11_RCP45_QMstations_1981-2099_SMA.nc
```

Note that depending on the underlying climate model simulation, the data series might contain missing values. These were introduced randomly in order to convert climate model output for simulations that employ reduced calendar lengths (360 days or 365 days) to full Gregorian calendars. This calendar conversion is described in more detail in Feigenwinter et al. (2018). It ensures internal consistency, i.e. for a given climate model simulation missing values were introduced randomly but at the very same days for all CH2018 data products (DAILY-LOCAL and DAILY-GRIDDED) - including all individual stations of the DAILY-LOCAL product - and for all meteorological variables. Missing values are represented as "NA" in *Rdata* and *csv* files and as "-999." in *nc* files. The headers of the *nc* and *csv* files contain additional meta information such as station details, variable units or the respective literature references. The attributes x_coord/XCOORD and y_coord/YCOORD refer to the East (E) and North (N) coordinates of the Swiss reference system CH1903+, respectively. The header of the *csv* files has a length of 18 lines, followed by the dates (first column) and the actual values (second column), separated by a semicolon (";"). No meta information is contained in the *Rdata* files. In the R programming language, the latter can be read in by the command

```
load('filename.Rdata')
```

which will produce a list object named *results.qm* with the actual data values represented by the vector *results.qm$data.series* and the dates represented by *results.qm$data.time*.

DAILY-GRIDDED

For a given climate model chain and a given meteorological variable the DAILY-GRIDDED data are provided as one NetCDF file that is named according to the convention

CH2018_[VARIABLE]_[SIMULATION]_QMgrid_1981-2099.nc

For example, the data file for daily mean temperature and the simulation CLMCOM-CCLM4_HADGEM_EUR11_RCP45 is named

`CH2018_tas_CLMCOM-CCLM4_HADGEM_EUR11_RCP45_QMgrid_1981-2099.nc`

The data files contain daily fields for the period 1981-2099 and on a 2km grid covering the whole of Switzerland. This grid corresponds to a slightly reduced version of the grids on which daily observational fields are provided by MeteoSwiss for historical periods (e.g., TabsD or RhiresD; see www.meteoswiss.admin.ch/home/climate/swiss-climate-in-detail/raeumliche-klimaanalysen.html for further information). The grid information as well as additional meta data are provided in the NetCDF attributes that are part of each data file.

4. Data access and license

All CH2018 datasets are published under the CC BY 4.0 license that includes the right to share (copy and redistribute in any medium or format) and adapt (remix, transform, and build upon for any purpose, even commercially) the data under the condition that proper reference to CH2018 is given (see doi.org/10.18751/Climate/Scenarios/CH2018/1.0). While some datasets are available via the CH2018 web atlas, the DAILY-LOCAL and DAILY-GRIDDED data are only available upon request via this contact form or by email to klimaszenarien@meteoschweiz.ch.

Registered users will receive a temporary user account name and password for data download by FTPS (FTP over TLS; recommended software: FileZilla or lftp). Once logged in, data can be downloaded from the following three directories:

`QMstations` -> DAILY-LOCAL datasets; subdirectories refer to the variable abbreviation (see Table 3)

`QMgrid` -> DAILY-GRIDDED datasets; subdirectories refer to the variable abbreviation (see Table 3)

`meta` -> meta information: Station metadata (stations_CH2018_meta.txt) and reference topography of the 2x2 km grid for the DAILY-GRIDDED product (topo.swiss02_ch02.lonlat_CH2018.nc)

5. Instructions for use and limitations

The DAILY-LOCAL and DAILY-GRIDDED scenarios provide transient daily data for several variables and for the period 1981-2099. In contrast to the previous CH2011 scenarios and to further delta-change based CH2018 datasets, they represent absolute values that are equivalent to measured series (DAILY-LOCAL) or to gridded observational analyses (DAILY-GRIDDED). In the period 1981-2010 which has served as reference for the bias correction and downscaling procedure and in a given time of year, the statistical distribution of the daily values in both products approximately corresponds to the distribution of their observational counterparts. Among others, this implies an approximate account of mean and extreme values in the reference period as well as, for the case of precipitation, a realistic representation of the wet day frequency.

Despite these attractive properties, the DAILY-LOCAL and DAILY-GRIDDED products are subject to a number of caveats and limitations. These are mostly connected to the fact that the statistical bias correction and downscaling method employed (QM) is entirely based on empirical evidence (comparison of observed and simulated data in the reference period); it does not introduce further process knowledge that might drive local-scale weather and climate processes which are not represented by the coarse-resolved underlying climate model output.

Chapter 5 of CH2018 (2018) and Feigenwinter et al. (2018) list the most important caveats and limitations of the datasets. These include the following issues:

- For a given climate model simulation, the temporal consistency of values for different products (DAILY-LOCAL and DAILY-GRIDDED), different stations/grid points and different variables is given. However, there is **no temporal correspondence with the observed evolution of weather** in the historical period. This is because the underlying GCM experiments were carried out in a free-running mode. For instance, the warm summer of 2003 as represented by the observational datasets cannot be expected to occur in the same year 2003 in the CH2018 data. Likewise, different climate model simulations are not temporally consistent with each other.
- The QM method approximately corrects for distributional biases in the historical period, but **remaining biases** of the corrected series are possible. This can, for instance, be the case for temporal climate variability, such as the sequence of wet and dry days. Temporal variability is inherited from the underlying climate model simulation and is not corrected for by QM. As the correction method is of an approximate nature only, even remaining biases in mean values are possible, though they are small in most cases.
- In the CH2018 setup, bias correction is carried out independently for the individual meteorological variables and does not explicitly consider **inter-variable dependencies**. Although previous works have shown that such dependencies are typically well represented, they might to some extent be misrepresented in the CH2018 data.
- The application of QM involves certain assumptions about biases in the extreme tails of the distribution. These assumptions directly impact **changes of extreme values** as represented by the bias-corrected data. Climate extremes in CH2018 data products should hence be handled with special care by users.
- **Spatial climate variability** at daily scale is not necessarily represented by the CH2018 data. This is especially true for the DAILY-GRIDDED product.
- A basic assumption of the bias correction employed in CH2018 is that the **model bias structure is stationary in time**, i.e. is also valid for a future climate. Although there are fair indications that this assumption is valid, it is not necessarily fulfilled in every case. The bias-corrected time series provided by CH2018 are hence subject to inherent uncertainties relating to model bias assumptions.
- As a consequence of the assumption of intensity-dependent biases by QM, the method can account for future changes in the mean model bias. This implies that the **application of QM can modify the**

raw models' climate change signals (which assume a constant mean bias) to some extent. This modification can be meaningful, but can in some cases also be a statistical artifact resulting from the adjustment of distributional widths. One example is the tendency of QM to overestimate temperature climate change signals at high elevations during parts of the year, and to underestimate them at valley locations.

- As a consequence of the previous issue but, in a more general sense, due the complete neglect of physical mechanisms driving local scale climate and climate change by QM, users should be extremely careful when deriving **complex local scale climate features** from the CH2018 data. This concerns, for instance, the intercomparison of climate change signals at two nearby stations or grid cells (frequency of inversions, etc.) or the analysis of elevation dependencies in the CH2018 data. Per se, such applications are not valid.
- **Uncertainties in the observational reference** (daily station series and grids) also translate into the bias-corrected CH2018 products. For instance, the effective resolution of the 2km gridded reference for precipitation is coarser than the nominal 2km resolution. As a consequence, also the bias-corrected DAILY-GRIDDED product does not fully represent spatial climate variability at the 2km scale. A further issue concerns the fact, that the observational precipitation data employed as reference for QM has not been corrected for the systematic undercatch of rain gauges which can be substantial especially for snowfall. As a result, also the DAILY-LOCAL and DAILY-GRIDDED precipitation data are subject to a systematic "undercatch" that, for instance, needs to be corrected for in hydrological applications.
- While producing the CH2018 scenarios, all products for the variables *tas*, *tasmax*, *tasmin* and *pr* have been thoroughly checked and validated. These variables are considered as most important and central to CH2018. The verification has been less rigorous for the **auxiliary variables *rsds*, *hurs* and *sfcWind*** that are part of the DAILY-LOCAL dataset. These variables are mainly provided in order to fulfil additional user requirements at the station scale, e.g. to provide further variables for energy balance applications that require an enlarged but internally consistent set of meteorological variables as input. Users are advised to treat CH2018 data for *rsds*, *hurs* and *sfcWind* with special care.

The mentioned issues should be accounted for and respected by scenario users in climate impact applications. **In many cases, their influence can be assessed by driving an impact model with the CH2018 data for the historical reference period 1981-2010 and by comparing the results to the case where the impact model is driven by observational data.** Thereby, the sensitivity of the impact model with respect to remaining biases in the CH2018 data can be assessed and quantified. In case of doubt concerning the applicability of the DAILY-LCOAL or DAILY-GRIDDED products for a specific application, the CH2018 data providers should be contacted.

To account for the inherent climate model and greenhouse gas scenario uncertainty, **we also advise users to employ a maximum number of CH2018 simulations** (see Table 1). In some cases and due to computational constraints, this might not be possible and an appropriate selection of simulations has to be accomplished. Such a selection has to be application-specific and should, generally, take into account the sensitivity of the investigated system, model performance in historical periods and the range of simulated climate change signals. The CH2018 consortium does not provide general suggestions for reduced model sets but provides some guidelines in Chapter 10.4 of CH2018 (2018).

Last but not least, users should be aware of the general guidelines for using EURO-CORDEX climate model data, which are available from www.euro-cordex.net/imperia/md/content/csc/cordex/euro-cordex-guidelines-version1.0-2017.08.pdf. The EURO-CORDEX homepage (www.euro-cordex.net) also provides access to an errata service from which information on potential errors of individual simulations or individual variables from specific simulations can be obtained in the future.

To keep this EURO-CORDEX errata service up-to-date and to ensure a high-quality of the CH2018 datasets in the future, we ask users to inform the CH2018 data providers on any spurious issues of the CH2018 data that are discovered in subsequent climate impact applications and analyses. Thank you!

References

CH2018 (2018) CH2018 – Climate Scenarios for Switzerland, Technical Report, National Centre for Climate Services, Zurich, 271 pp. ISBN: 978-3-9525031-4-0.

Feigenwinter I, Kotlarski S, Casanueva A, Fischer AM, Schwierz C, Liniger MA (2018) Exploring quantile mapping as a tool to produce user-tailored climate scenarios for Switzerland, Technical Report No. 270, MeteoSwiss, Zurich, 44 pp.

Appendix

Table 1 The EURO-CORDEX climate model simulations employed in CH2018 and the available variables. The first column lists the simplified CH2018 simulation identifier used in the CH2018 data files and following the scheme [RCM]_[GCM]_[RESOLUTION]_[SCENARIO]. [RCM] and [GCM] represent abbreviations of the full CORDEX model names (see Table 2). [RESOLUTION] refers to the spatial resolution of the original EURO-CORDEX climate model output (EUR11: approx. 12 km; EUR44: approx. 50 km), and [SCENARIO] to the respective greenhouse gas scenario (RCP2.6, RCP4.5, and RCP8.5). "REMO1" and "REMO2" refer to two different realizations of the same GCM-RCM model chain (identical models but different initial conditions). For further information on the CH2018 model set see the full CH2018 model documentation (freeze 2.1) available from www.climate-scenarios.ch and Chapters 2.1 and 4.2 in CH2018 (2018).

CH2018 Simulation Name	*tas*	*tasmax*	*tasmin*	*pr*	*rsds*	*hurs*	*sfcWind*
CLMCOM-CCLM4_ECEARTH_EUR11_RCP45	X	X	X	X	X		X
CLMCOM-CCLM4_ECEARTH_EUR11_RCP85	X	X	X	X	X		X
CLMCOM-CCLM4_HADGEM_EUR11_RCP45	X	X	X	X	X		X
CLMCOM-CCLM4_HADGEM_EUR11_RCP85	X	X	X	X	X		X
CLMCOM-CCLM4_HADGEM_EUR44_RCP85	X	X	X	X	X	X	X
CLMCOM-CCLM4_MPIESM_EUR11_RCP45	X	X	X	X	X		X
CLMCOM-CCLM4_MPIESM_EUR44_RCP45	X	X	X	X	X		X
CLMCOM-CCLM4_MPIESM_EUR11_RCP85	X	X	X	X	X		X
CLMCOM-CCLM4_MPIESM_EUR44_RCP85	X	X	X	X	X		X
CLMCOM-CCLM5_ECEARTH_EUR44_RCP85	X	X	X	X	X	X	X
CLMCOM-CCLM5_MIROC_EUR44_RCP85	X	X	X	X	X	X	X
CLMCOM-CCLM5_MPIESM_EUR44_RCP85	X	X	X	X	X	X	X
CLMCOM-CCLM5_HADGEM_EUR44_RCP85	X	X	X	X	X	X	X
DMI-HIRHAM_ECEARTH_EUR11_RCP26	X	X	X	X	X	X	X
DMI-HIRHAM_ECEARTH_EUR11_RCP45	X	X	X	X	X	X	X
DMI-HIRHAM_ECEARTH_EUR44_RCP45	X	X	X	X	X	X	X
DMI-HIRHAM_ECEARTH_EUR11_RCP85	X	X	X	X	X	X	X
DMI-HIRHAM_ECEARTH_EUR44_RCP85	X	X	X	X	X	X	X
ICTP-REGCM_HADGEM_EUR44_RCP85	X	X	X	X			X
KNMI-RACMO_ECEARTH_EUR44_RCP45	X	X	X	X	X	X	X
KNMI-RACMO_ECEARTH_EUR44_RCP85	X	X	X	X	X	X	X
KNMI-RACMO_HADGEM_EUR44_RCP26	X	X	X	X	X	X	X
KNMI-RACMO_HADGEM_EUR44_RCP45	X	X	X	X	X	X	X
KNMI-RACMO_HADGEM_EUR44_RCP85	X	X	X	X	X	X	X
MPICSC-REMO1_MPIESM_EUR11_RCP26	X	X	X	X	X		X
MPICSC-REMO1_MPIESM_EUR44_RCP26	X	X	X	X	X		X
MPICSC-REMO1_MPIESM_EUR11_RCP45	X	X	X	X	X		X
MPICSC-REMO1_MPIESM_EUR44_RCP45	X	X	X	X	X		X
MPICSC-REMO1_MPIESM_EUR11_RCP85	X	X	X	X	X		X
MPICSC-REMO1_MPIESM_EUR44_RCP85	X	X	X	X	X		X
MPICSC-REMO2_MPIESM_EUR11_RCP26	X	X	X	X	X		X
MPICSC-REMO2_MPIESM_EUR44_RCP26	X	X	X	X	X		X

CH2018 Simulation Name	*tas*	*tasmax*	*tasmin*	*pr*	*rsds*	*hurs*	*sfcWind*
MPICSC-REMO2_MPIESM_EUR11_RCP45	X	X	X	X	X		X
MPICSC-REMO2_MPIESM_EUR44_RCP45	X	X	X	X	X		X
MPICSC-REMO2_MPIESM_EUR11_RCP85	X	X	X	X	X		X
MPICSC-REMO2_MPIESM_EUR44_RCP85	X	X	X	X	X		X
SMHI-RCA_ECEARTH_EUR11_RCP26	X	X	X	X	X	X	X
SMHI-RCA_ECEARTH_EUR44_RCP26	X	X	X	X	X	X	X
SMHI-RCA_ECEARTH_EUR11_RCP45	X	X	X	X	X	X	X
SMHI-RCA_ECEARTH_EUR44_RCP45	X	X	X	X	X	X	X
SMHI-RCA_ECEARTH_EUR11_RCP85	X	X	X	X	X	X	X
SMHI-RCA_ECEARTH_EUR44_RCP85	X	X	X	X	X	X	X
SMHI-RCA_IPSL_EUR11_RCP45	X	X	X	X	X	X	X
SMHI-RCA_IPSL_EUR44_RCP45	X	X	X	X	X	X	X
SMHI-RCA_IPSL_EUR11_RCP85	X	X	X	X	X	X	X
SMHI-RCA_IPSL_EUR44_RCP85	X	X	X	X	X	X	X
SMHI-RCA_HADGEM_EUR44_RCP26	X	X	X	X	X	X	X
SMHI-RCA_HADGEM_EUR11_RCP45	X	X	X	X	X	X	X
SMHI-RCA_HADGEM_EUR44_RCP45	X	X	X	X	X	X	X
SMHI-RCA_HADGEM_EUR11_RCP85	X	X	X	X	X	X	X
SMHI-RCA_HADGEM_EUR44_RCP85	X	X	X	X	X	X	X
SMHI-RCA_MPIESM_EUR44_RCP26	X	X	X	X	X	X	X
SMHI-RCA_MPIESM_EUR11_RCP45	X	X	X	X	X	X	X
SMHI-RCA_MPIESM_EUR44_RCP45	X	X	X	X	X	X	X
SMHI-RCA_MPIESM_EUR11_RCP85	X	X	X	X	X	X	X
SMHI-RCA_MPIESM_EUR44_RCP85	X	X	X	X	X	X	X
SMHI-RCA_CCCMA_EUR44_RCP45	X	X	X	X	X	X	X
SMHI-RCA_CCCMA_EUR44_RCP85	X	X	X	X	X	X	X
SMHI-RCA_CSIRO_EUR44_RCP45	X	X	X	X	X	X	X
SMHI-RCA_CSIRO_EUR44_RCP85	X	X	X	X	X	X	X
SMHI-RCA_MIROC_EUR44_RCP26	X	X	X	X	X	X	X
SMHI-RCA_MIROC_EUR44_RCP45	X	X	X	X	X	X	X
SMHI-RCA_MIROC_EUR44_RCP85	X	X	X	X	X	X	X
SMHI-RCA_NORESM_EUR44_RCP26	X	X	X	X	X	X	X
SMHI-RCA_NORESM_EUR44_RCP45	X	X	X	X	X	X	X
SMHI-RCA_NORESM_EUR44_RCP85	X	X	X	X	X	X	X
SMHI-RCA_GFDL_EUR44_RCP45	X	X	X	X	X	X	X
SMHI-RCA_GFDL_EUR44_RCP85	X	X	X	X	X	X	X
TOTAL	**68**	**68**	**68**	**68**	**67**	**47**	**68**

Table 2 RCM and GCM abbreviations employed in the CH2018 data file names. Full names refer to the model names as provided by the EURO-CORDEX initiative. For further details see www.euro-cordex.net. r1i1p1 and r2i1p1 refer to different realizations of the driving GCM.

Full EURO-CORDEX RCM name	CH2018 abbreviation [RCM]
CLMcom-CCLM4-8-17	CLMCOM-CCLM4
CLMcom-CCLM5-0-6	CLMCOM-CCLM5
DMI-HIRHAM5	DMI-HIRHAM
ICTP-RegCM4-3	ICTP-REGCM
KNMI-RACMO22E	KNMI-RACMO
MPI-CSC-REMO2009 (r1i1p1)	MPICSC-REMO1
MPI-CSC-REMO2009 (r2i1p1)	MPICSC-REMO2
SMHI-RCA4	SMHI-RCA
Full EURO-CORDEX/CMIP5 GCM name	**CH2018 abbreviation [GCM]**
ICHEC-EC-EARTH	ECEARTH
MOHC-HadGEM2-ES	HADGEM
MPI-M-MPI-ESM-LR	MPIESM
MIROC-MIROC5	MIROC
IPSL-IPSL-CM5A-MR	IPSL
CCCma-CanESM2	CCCMA
CSIRO-QCCCE-CSIRO-Mk3-6-0	CSIRO
NCC-NorESM1-M	NORESM
NOAA-GFDL-GFDL-ESM2M	GFDL

Table 3 List of meteorological variables covered by the CH2018 datasets DAILY-LOCAL and DAILY-GRIDDED and their respective availability including the number of available stations for the DAILY-LOCAL product.

Variable name	Abbreviation	Unit	DAILY-LOCAL (No. of stations)	DAILY-GRIDDED
Daily mean 2m temperature	***tas***	°C	X (85)	X
Daily maximum 2m temperature	***tasmax***	°C	X (85)	X
Daily minimum 2m temperature	***tasmin***	°C	X (86)	X
Daily precipitation sum	***pr***	mm/day	X (399)	X
Daily mean global radiation	***rsds***	W/m^2	X (59)	-
Daily mean relative humidity	***hurs***	%	X (84)	-
Daily mean near-surface wind speed	***sfcWind***	m/s	X (84)	-

Table 4 Available stations in the DAILY-LOCAL product. Only the respective station abbreviations are listed. For the full station meta information (including full station name, location and elevation) we refer to the accompanying document *stations_CH2018_meta.txt*.

Variable	Available stations (station abbreviation)
tas	ABO AIG ALT ANT ARO BAS BEH BER BIL BRL BUF BUS CDF CGI CHA CHD CHM CHU CIM COV DAV DEM DIS DOL EBK EIN ELM ENG FAH FRE GLA GRA GRC GRH GRO GSB GST GUE GUT GVE HAI HIR HLL INT JUN KLO KOP LAG LUG LUZ MAG MER MLS MVE NAP NEU OTL PAY PIL PIO PUY RAG REH RHF ROB RUE SAE SAM SBE SBO SCU SHA SIA SIO SMA SMM STG TAE ULR VAD VIS WAE WFJ WYN ZER
tasmax	ABO AIG ALT ARO BAS BEH BER BIL BRL BUF BUS CDF CGI CHA CHD CHM CHU CIM CLA COV DAV DEM DIS DOL EBK EIN ELM ENG FAH FRE GLA GRA GRC GRH GRO GSB GST GUE GUT GVE HAI HIR HLL INT JUN KLO KOP LAG LUG LUZ MAG MER MLS MVE NAP NEU OTL PAY PIL PIO PUY RAG REH RHF ROB RUE SAE SAM SBE SBO SCU SHA SIA SIO SMA SMM STG TAE ULR VAD VIS WAE WFJ WYN ZER
tasmin	ABO AIG ALT ANT ARO BAS BEH BER BIL BRL BUF BUS CDF CGI CHA CHD CHM CHU CIM CLA COV DAV DEM DIS DOL EBK EIN ELM ENG FAH FRE GLA GRA GRC GRH GRO GSB GST GUE GUT GVE HAI HIR HLL INT JUN KLO KOP LAG LUG LUZ MAG MER MLS MVE NAP NEU OTL PAY PIL PIO PUY RAG REH RHF ROB RUE SAE SAM SBE SBO SCU SHA SIA SIO SMA SMM STG TAE ULR VAD VIS WAE WFJ WYN ZER
pr	ABE ABG ABO AFI AFT AIE AIG AIR ALM ALS ALT ALV ALW AMW AND ANT APP APT ARB ARI ARO AST AUB AVA AVB AVE BAM BAS BAT BAU BAW BEH BEP BER BEX BEY BIA BIE BIL BIN BIS BIV BIZ BLS BLU BLZ BMU BNE BNU BOS BOT BOV BOZ BRA BRI BRL BRO BRP BRT BRW BRZ BSG BSP BUC BUD BUE BUF BUS BZL BZN CAC CAV CDF CDM CEV CGI CHA CHB CHD CHM CHU CHX CHY CIM CLA CMD CNZ COG COL COP COS COU COV COY CTA CTO CUE DAV DEH DEM DIB DIE DIS DIT DMA DOB DOL EBK ECH EFF EGL EGO EGR EHM EIN EIT EKO ELM ENG ENT EPT ERB ERI ESZ EUT FAH FAI FIL FLI FLU FLW FRC FRE FRF FRI FRU GAD GEA GECHE GEP GHS GIH GIN GLA GOA GOS GRA GRC GRH GRI GRO GRY GSB GSG GSS GST GTT GUE GUG GUT GVE GWA HAI HAU HEB HEK HER HES HIR HIW HLL HON HOY HTW HUT ILH ILZ INF INN INT IST JAU JUS KAI KAL KAR KAS KIB KIE KLA KLO KLT KOP KRO KSE KUA KUE LAB LAC LAG LAN LAP LAT LEH LEU LFB LGA LOB LOC LOH LON LOT LSN LTB LUG LUN LUT LUZ MAC MAD MAG MAL MAR MAS MAT MBA MDO MER MES MEV MGB MGI MGL MHA MLS MMO MOA MOB MOE MOS MOU MSG MST MTE MUE MUO MUR MUS MUT MVE NAP NEB NEU NIE OBD OBI OED OLI OPF ORS ORZ OTE OTL PAV PAY PDM PFA PIG PIL PIO PON POT PUD PUY RAG REG REH REM RHF RIC RIE RIX ROB ROM ROT RUE SAE SAG SAI SAM SAP SAR SAX SBE SBO SCA SCD SCE SCH SCU SDO SED SEM SEV SGD SHA SIA SIE SIH SIM SIO SMA SMM SNG SNS SOG SPA SPZ SRE SRN STB STE STG STP STU SUA SUG SUS SVG SWA SZB TAE TAM TAV TAW TDG TEU TFD THI THS THU TIC TIGNO TIISO TILOD TRO TRU TST UBB UER ULR UNK UNS URB URN UST VAD VAE VAR VEV VIG VIS VIT VLS VRI VST VVI WAE WAG WBR WCH WDO WEE WEF WET WFJ WHA WHF WID WIE WIN WIS WIT WIW WOB WYN YVN ZER ZEV ZHBAM ZHBID ZHMON ZHNIE ZHTUR ZHZEL ZNZ ZUB ZWE ZWK
rsds	ABO AIG ALT BAS BER BUS CDF CGI CHA CHU CIM COV DAV DIS DOL ENG FAH FRE GLA GSB GUE GUT GVE HIR INT JUN KLO LUG LUZ MAG MLS MVE NAP NEU OTL PAY PIL PIO PUY REH ROB RUE SAE SAM SBE SBO SCU SHA SIO SMA STG TAE ULR VAD VIS WAE WFJ WYN ZER
hurs	ABO AIG ALT ANT ARO BAS BEH BER BIL BRL BUF BUS CDF CGI CHA CHD CHM CHU CIM COV DAV DEM DIS DOL EBK EIN ELM ENG FAH FRE GLA GRA GRC GRH GRO GSB GST GUE GUT GVE HAI HIR HLL INT JUN KLO KOP LAG LUG LUZ MAG MER MLS MVE NAP NEU OTL PAY PIL PIO PUY RAG REH ROB RUE SAE SAM SBE SBO SCU SHA SIA SIO SMA SMM STG TAE ULR VAD VIS WAE WFJ WYN ZER
sfcWind	ABO AIG ALT ARO BAS BER BIL BRL BUF BUS CDF CGI CHA CHD CHM CHU CIM COV DAV DEM DIS DOL EBK EIN ELM ENG FAH FRE GLA GOE GRA GRC GRH GSB GST GUE GUT GVE HAI HIR HLL INT JUN KLO KOP LAG LEI LUG LUZ MAG MER MLS MUB MVE NAP NEU OTL PAY PIL PIO PUY RAG REH RHF ROB RUE SAE SAM SBE SBO SCU SHA SIO SMA SMM STG TAE ULR VAD VIS WAE WFJ WYN ZER