Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
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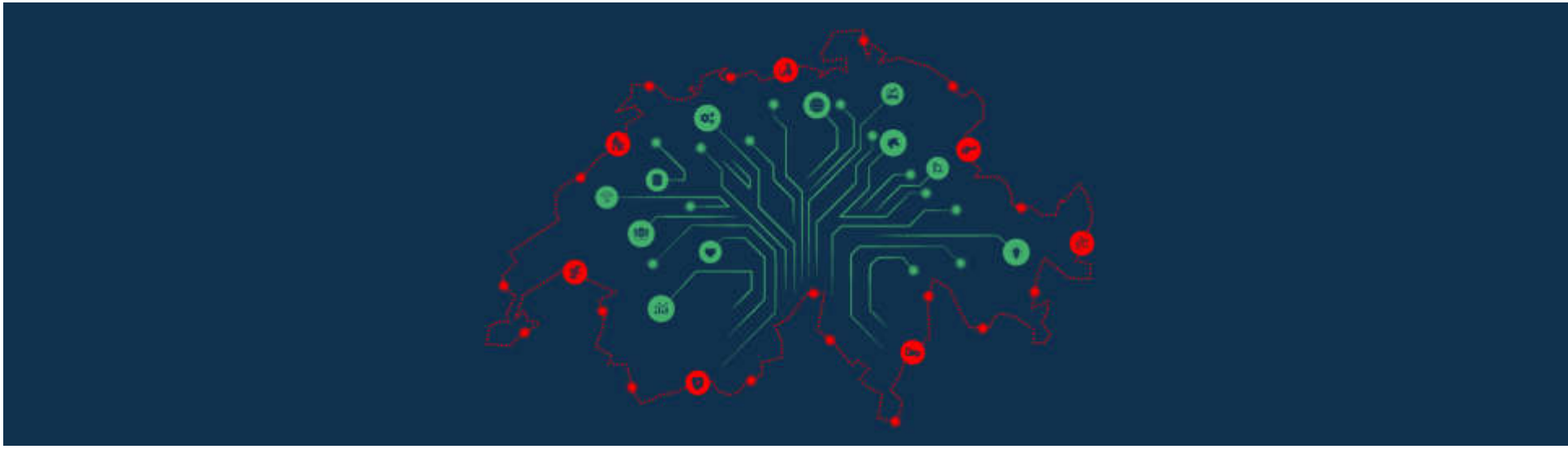
Swiss Confederation

Federal Department of Finance FDF
Federal Office of Information Technology, Systems and Telecommunication FOITT

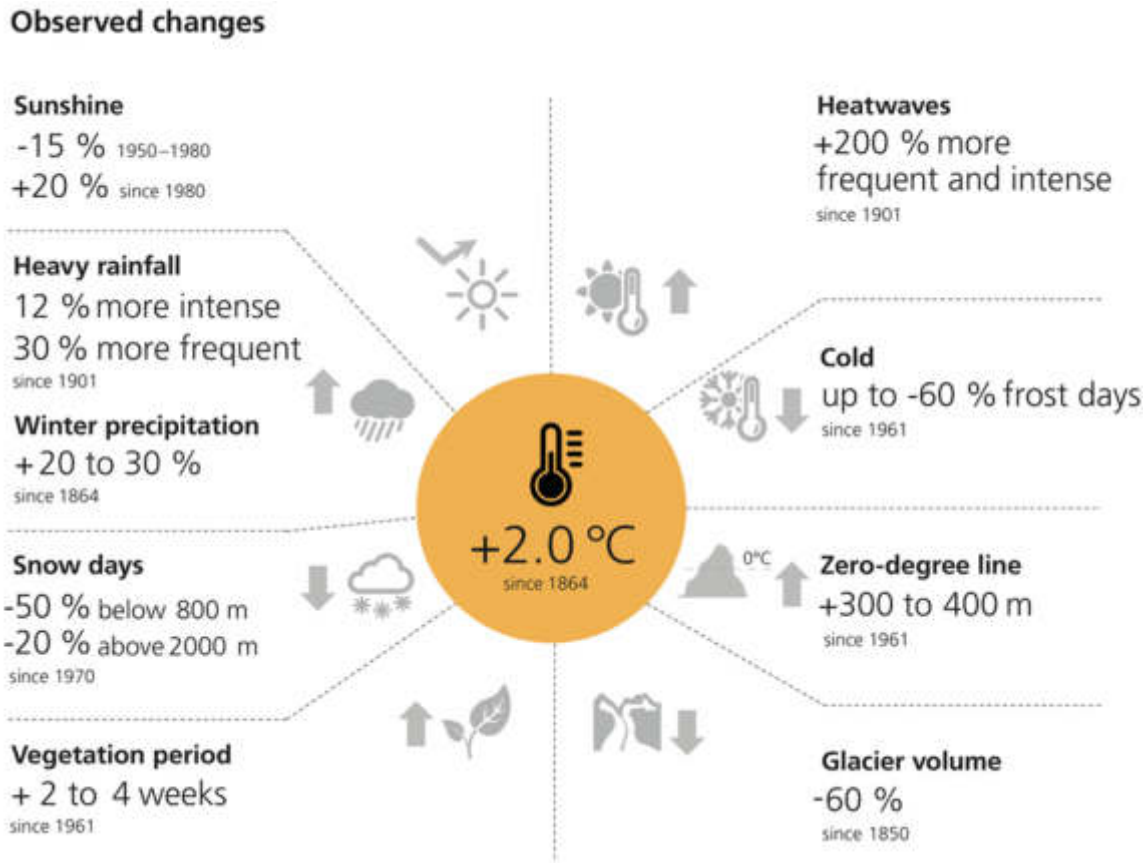
Federal Department of Home Affairs FDHA
Federal Statistical Office FSO



#18 Make Climate Change Tangible for Swiss Citizens

Help us find innovative, user-friendly and intuitive solutions to empower citizens to make informed decisions!

The Swiss climate has changed

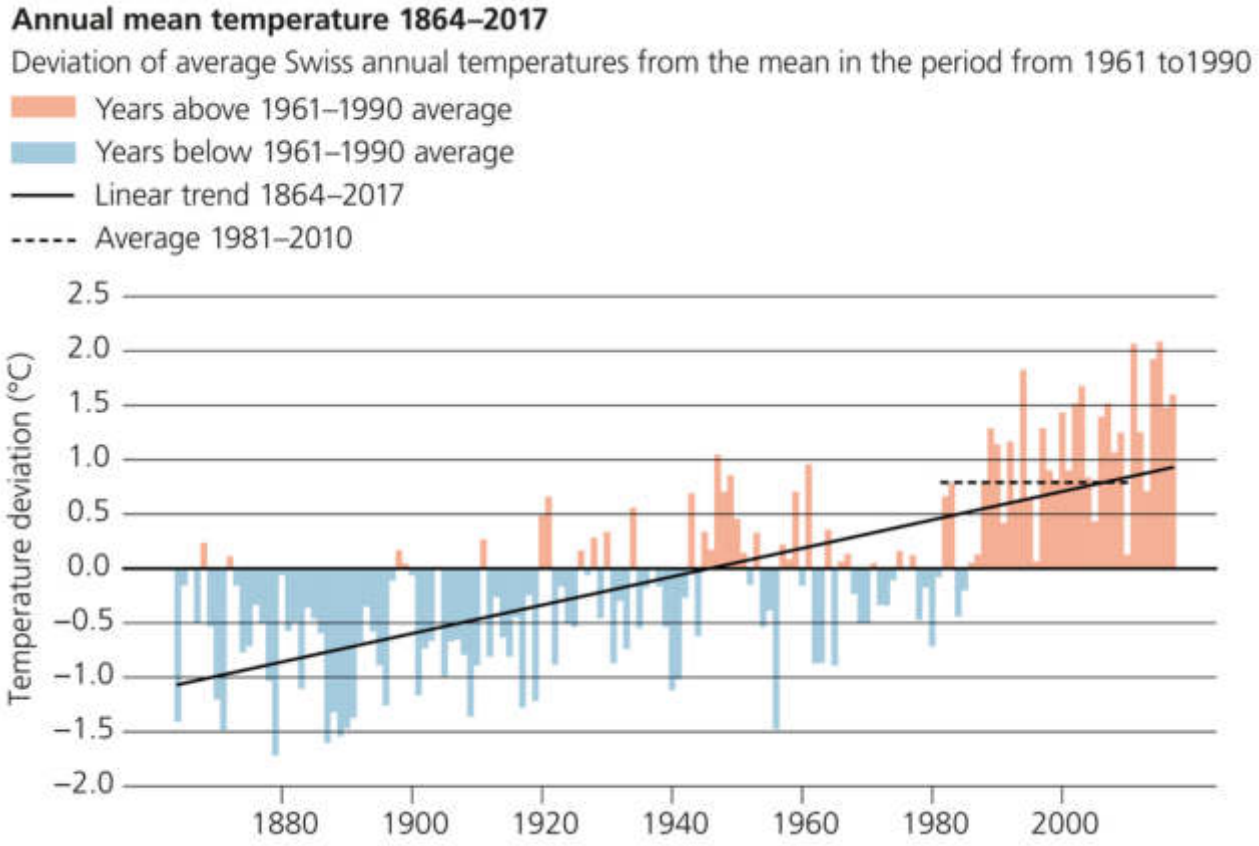


Hauteur record de l'isotherme du zéro degré

L'été caniculaire de 2022 a porté l'isotherme du zéro degré au-dessus de la Suisse à une altitude record de 5184 m, atteinte le 25 juillet 2022. Lors des étés caniculaires de 2015 et 2003, l'altitude maximale de l'isotherme du zéro degré ne s'est pas située dans la fourchette des dix valeurs les plus élevées jamais mesurées. Les mesures de l'altitude quotidienne de la limite du zéro degré sont effectuées depuis 1954 à l'aide de ballons-sondes envoyés depuis Payerne.

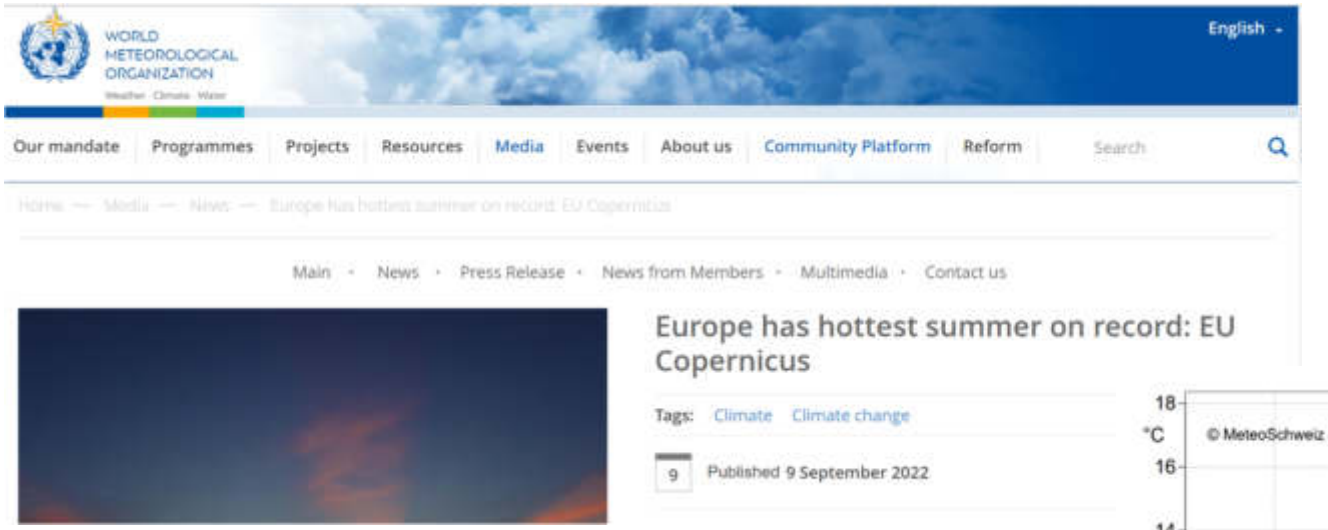
Source: MeteoSwiss

The average temperature increase in Switzerland is above the worldwide average

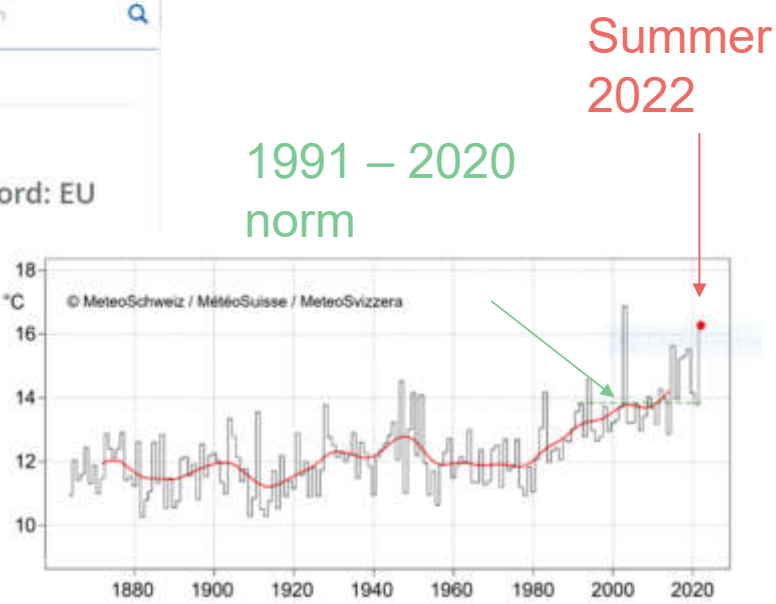


Source: MeteoSwiss

Summer 2022: the hottest to date



Source: MeteoSwiss



Average summer (jun-aug) temperature since 1864

Summer 2022: Glaciers melting at record speed

Tweet by Dr Matthias Huss, Prof. in glaciology at ETHZ

Source: MeteoSwiss

Summer 2022: Drying lakes and riverbeds

Lac des Brenets - 28.07.2022

Image 16 / 23

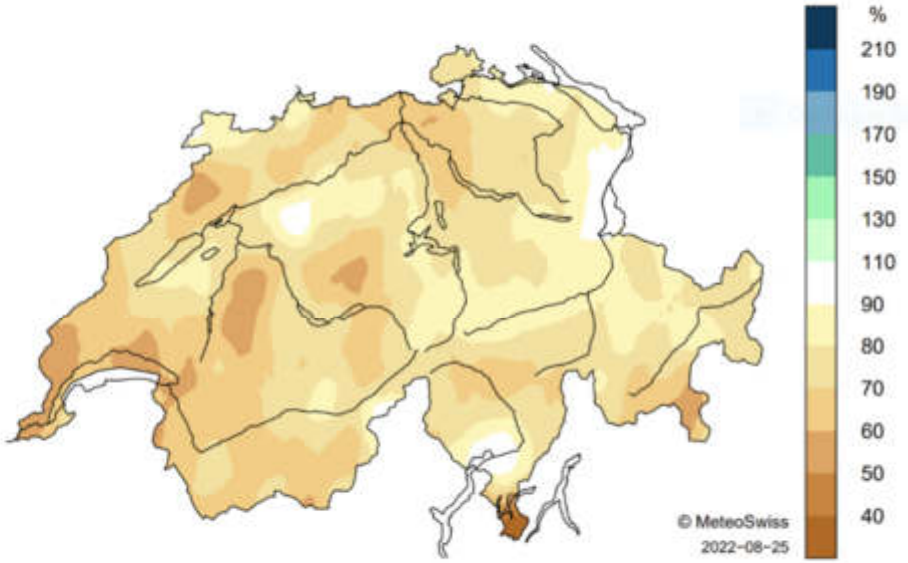
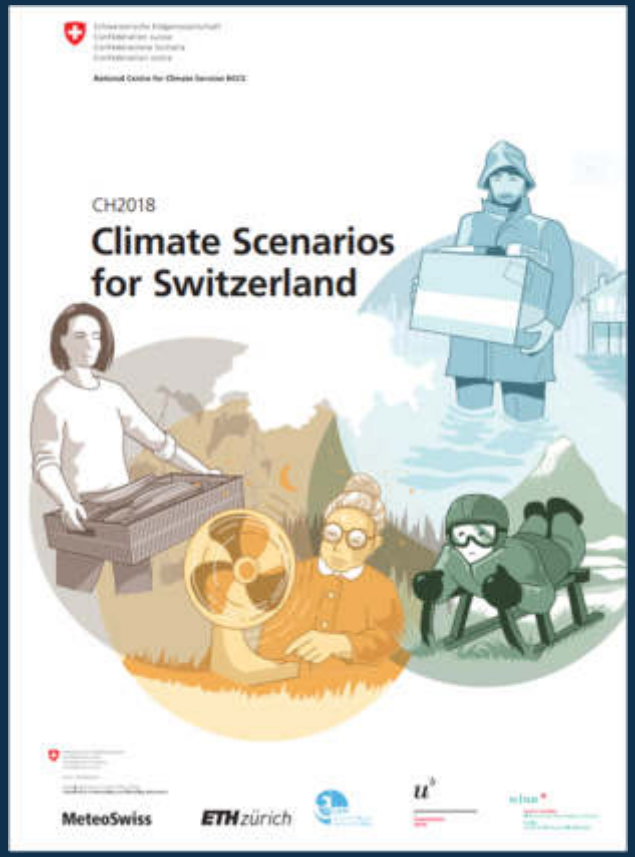
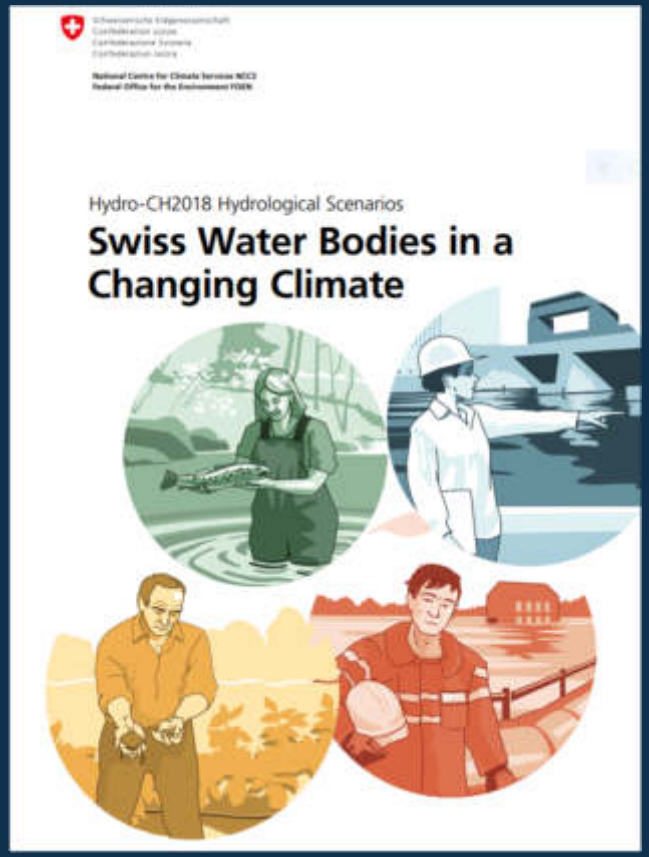


Figure 4. Répartition spatiale des sommes de précipitations en été 2022, représentée en % de la norme 1991-2020. Etat au 24.08.2022

Source: MeteoSwiss

Our future climate

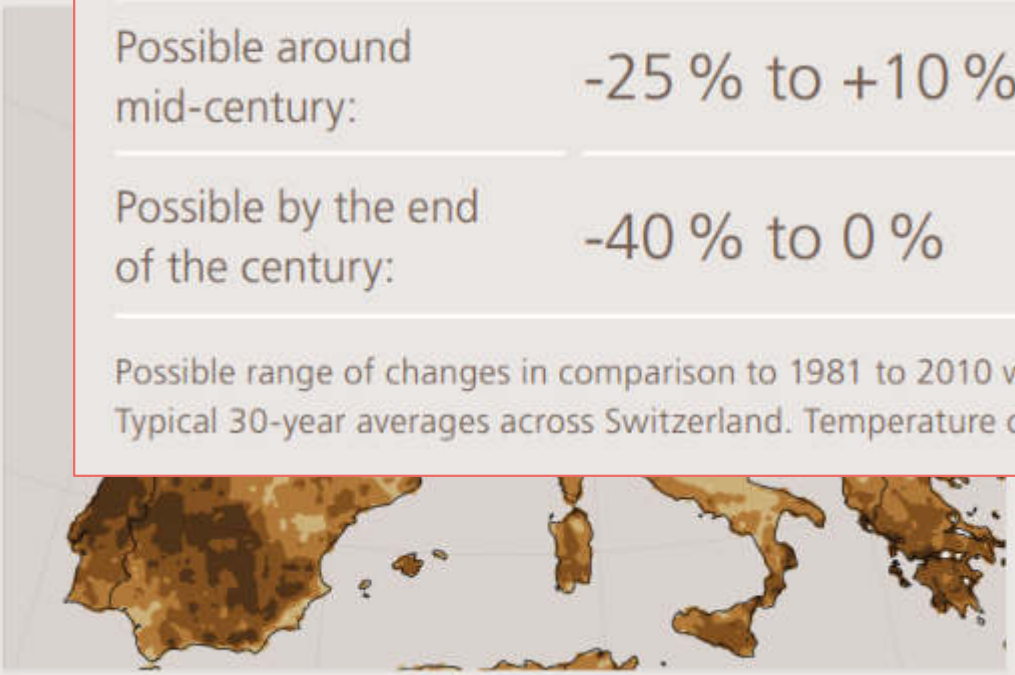




Dry summers

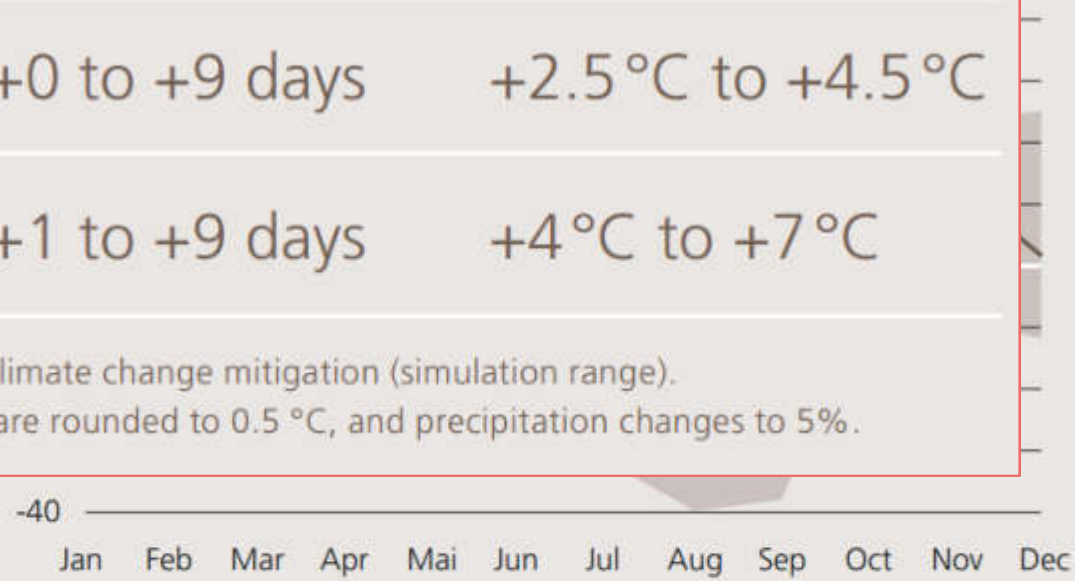
Change in the longest dry period in summer

Expected change around 2060 without climate change mitigation, in co



Change in precipitation in La Chaux-de-Fonds

Change over the course of the year around 2060 without climate change



	Summer precipitation	Longest dry period in summer	Summer temperature
Possible around mid-century:	-25 % to +10 %	+0 to +9 days	+2.5 °C to +4.5 °C
Possible by the end of the century:	-40 % to 0 %	+1 to +9 days	+4 °C to +7 °C

Possible range of changes in comparison to 1981 to 2010 without climate change mitigation (simulation range).
Typical 30-year averages across Switzerland. Temperature changes are rounded to 0.5 °C, and precipitation changes to 5%.

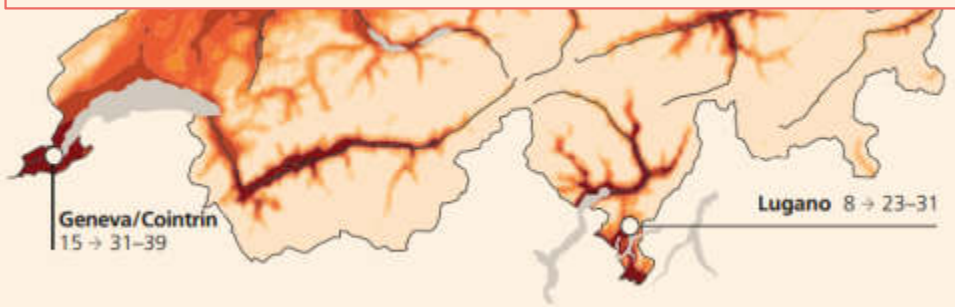
More hot days

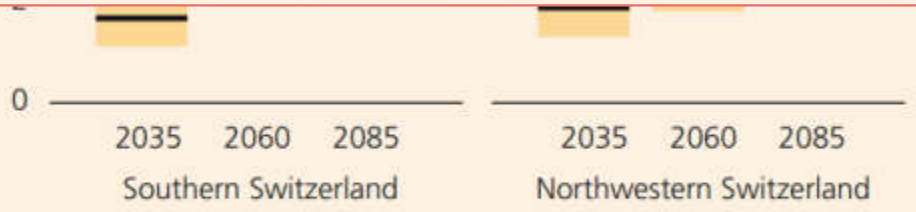
Change in number of hot days
Changes in the number of days with temperatures above 30 °C around

Change in annual maximum temperature
Average change around 2035, 2060 and 2085 without climate change mitigation,

	Hottest day of the year	Number of very hot days**
Possible around mid-century:	+2 °C to +5.5 °C	+3 to +17 days
Possible by the end of the century:	+4 °C to +8.5 °C	+12 to +37 days

Possible range of changes in comparison to 1981 to 2010 without climate change mitigation (simulation range).
Typical 30-year averages across Switzerland. Temperature changes are rounded to 0.5 °C.
**See explanation in main text.

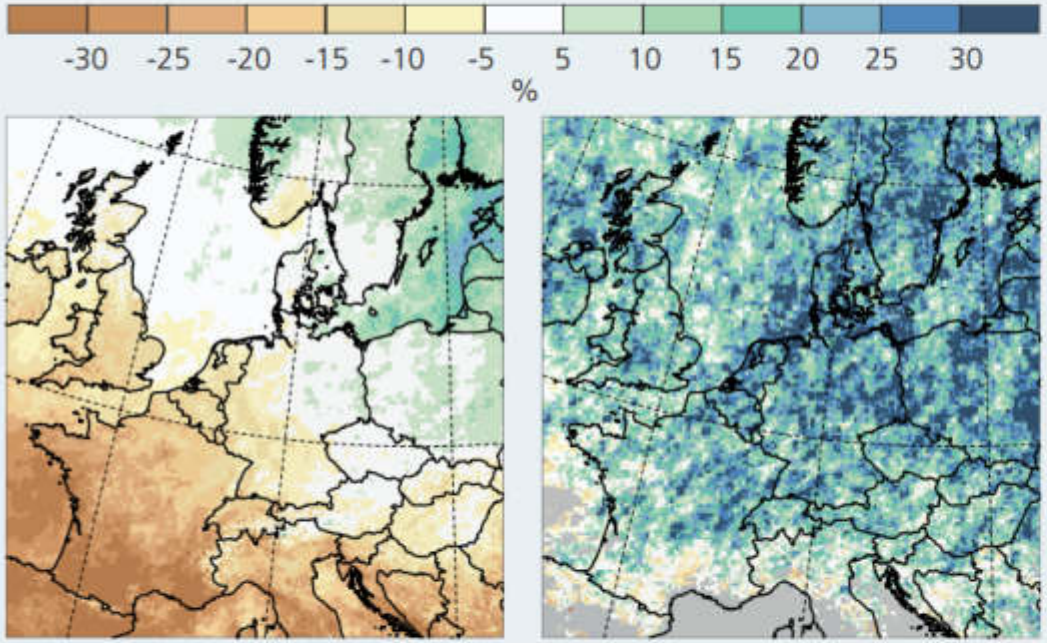




Heavy precipitation

Change in average and extreme precipitation in summer

Change around 2060 without climate change mitigation, in comparison to 1981–2010 (30-year averages).

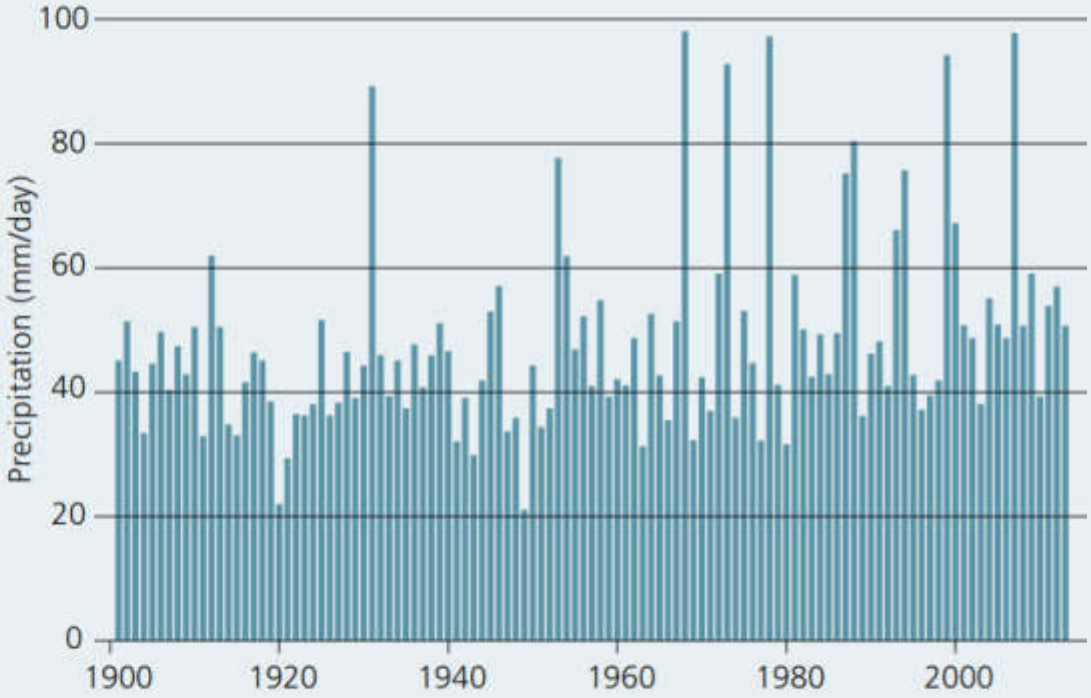


Average summer precipitation

100-year single-day precipitation event

Extremes intensify

Heaviest single-day precipitation event of the year in Zurich



Variability of extremes obscures the trend

Snow-scarce winters

Change in number of days with snowfall

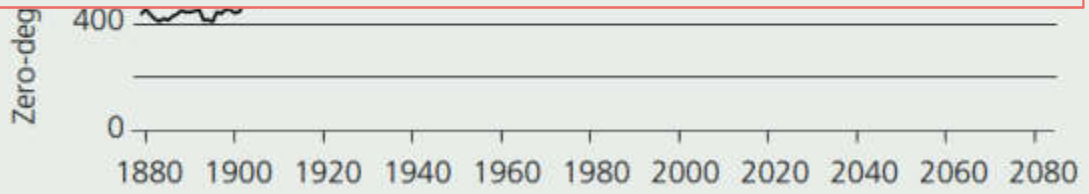
Expected changes around 2060 without climate change mitigation,

Zero-degree line

Zero-degree line in winter (Swiss average and 30-year running average).

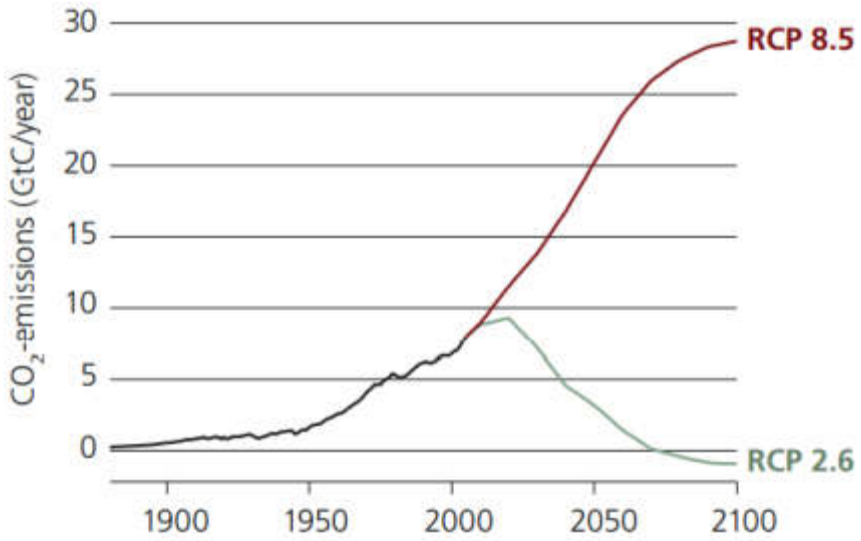
	Winter temperature	Elevation increase of the zero-degree line in winter
Possible around mid-century:	+2 °C to +3.5 °C	400 m to 650 m
Possible by the end of the century:	+3 °C to +5.5 °C	700 m to 1050 m

Possible range of changes in comparison to 1981 to 2010 without climate change mitigation (simulation range).
Typical 30-year averages across Switzerland. Temperature changes are rounded to 0.5 °C.



3 greenhouse-gas emission scenarios in CH2018: RCP2.6, RCP4.5 and RCP8.5

Emission scenarios
Global net fossil fuel and industrial CO_2 emissions.
(Source: adapted from IPCC 2013/WGI/Box 1.1/Figure 3b)
No climate change mitigation
Concerted mitigation efforts



RCP = Representative Concentration Pathway

The Technical Report for CH2018 also investigates a middle-of-the-road scenario with limited climate change mitigation (RCP4.5).

Guide to climate projection data: Filenames

CH2018 - Climate Scenarios for Switzerland
Transient daily time series at the local scale

Guide to climate projection data: Filenames

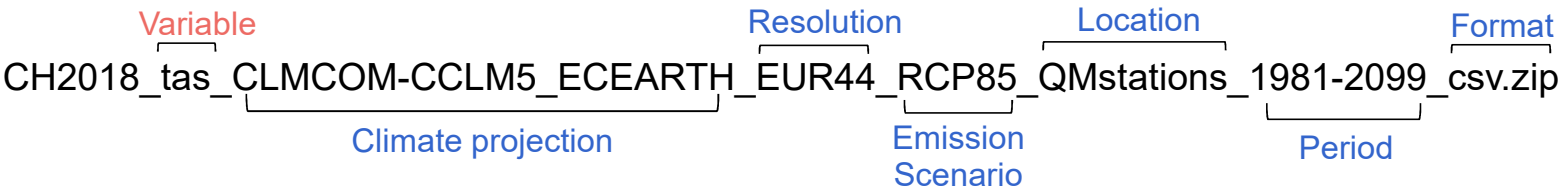
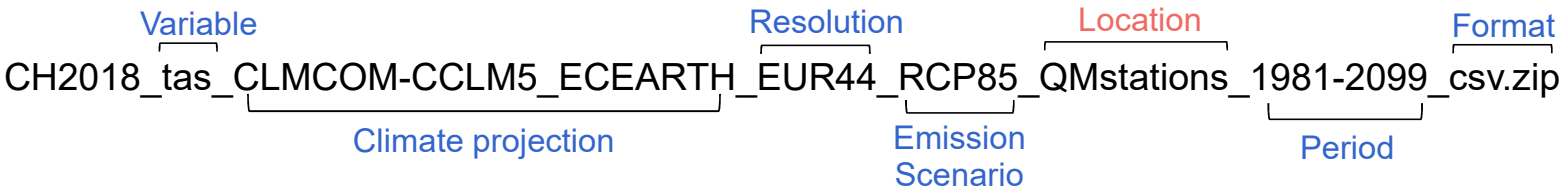


Table 3 List of meteorological variables covered by the CH2018 datasets DAILY-LOCAL and DAILY-GRIDDED and their respective availability including the number of available stations for the DAILY-LOCAL product.

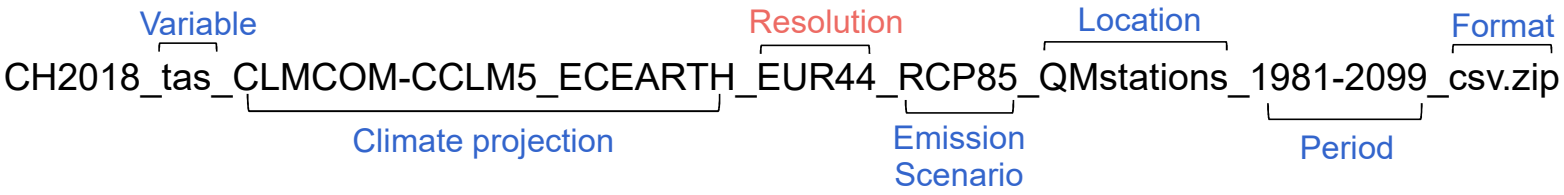
Variable name	Abbreviation	Unit	DAILY-LOCAL (No. of stations)	DAILY-GRIDDED
Daily mean 2m temperature	*tas*	°C	X (85)	X
Daily maximum 2m temperature	*tasmax*	°C	X (85)	X
Daily minimum 2m temperature	*tasmin*	°C	X (86)	X
Daily precipitation sum	*pr*	mm/day	X (399)	X
Daily mean global radiation	*rsds*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

Guide to climate projection data: Filenames



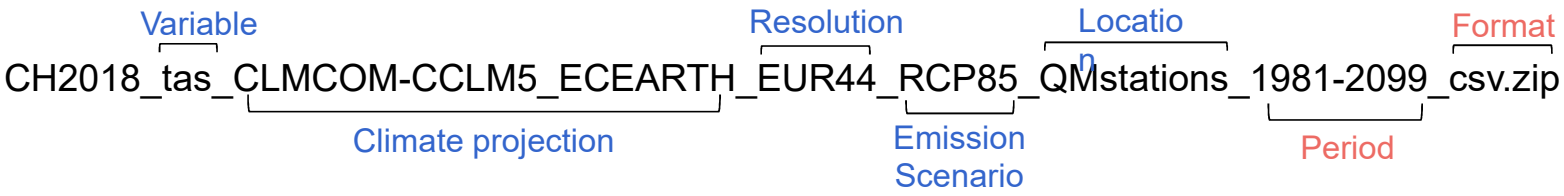
QMStations	**file contains projections at individual Swiss weather stations also referred to as DAILY-LOCAL data metadata: stations_CH2018_meta.txt**
QMGrid	file contains projections on a regular 2km grid covering the area of Switzerland also referred to as DAILY-GRIDDED data metadata: reference topography of the 2x2 km grid topo.swiss02_ch02.lonlat_CH2018.nc

Guide to climate projection data: Filenames



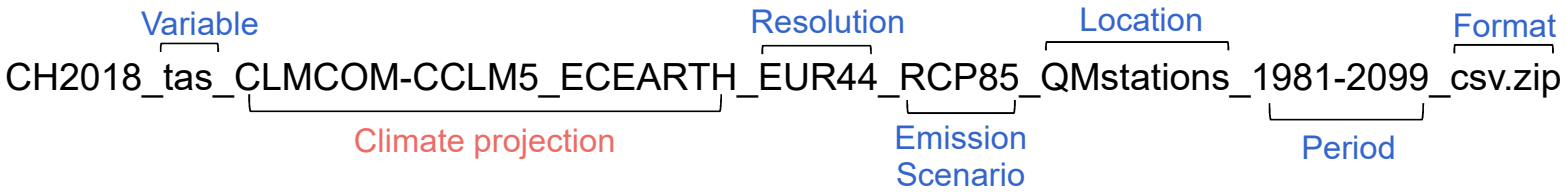
- Resolution:
  - refers to the spatial resolution of the original climate model output
  - EUR11: approx. 12 km
  - EUR44: approx. 50 km

Guide to climate projection data: Filenames



- **Period: Start and end year for daily projections**
- **Format**
  - **QMStations**
    - data is in zip folders
    - zip folder contains one file per station in the same format
    - stations file formats: netcdf, Rdata or csv
    - station files naming convention:
    - CH2018_[VARIABLE]_[SIMULATION]_QMstations_1981-2099_[STATION].[FILEFORMAT]
  - **QMGrid**
    - all files are .nc (NetCDF - Network Common Data Form)

Guide to climate projection data: Filenames



- Abbreviated name of EURO-CORDEX climate model simulations used to generate projections
- Regional climate scenarios using different combinations of global and regional climate models www.euro-cordex.net
- These are free run models not future weather forecasts!!

Projection data dos and don’ts

- DO only compare variables across different CO2 scenarios (RCP) from the **same projection**
- DO use the scenario to look at changes in a variable (i.e. maximum temperature) compared to a reference period
- DO count total number of days it rained / it was hot

- DON’T take the mean value of a variable across different climate scenarios
- DON’T assume that the projected value = a prediction of weather for that day in the future e.g. -8°C in August!
- DON’T count number of sequential days of rain / hot weather

The norm / reference periods for historical comparisons and climate projections

Reference periods are normally 30 years long (to account for intrinsic climate variability).

The Climate Scenarios CH2018 each describe an average level of climatic conditions over a period of **three decades**, grouped around the years **2035, 2060 and 2085**. When the text refers to the “middle of this century” or 2060, this refers to the period from 2045 to 2074. Similarly, a reference to the “end of the century” means 2070 to 2099.

- Climate scenarios CH2018 and Hydro-CH2018: reference = **1981 – 2010**
  But beware, in publications after 2021, reference = **1991 – 2020**.
  And for some historical comparisons, reference is often **1961 – 1990** (or even earlier, sometimes pre-industrial). !! Be aware of the reference, since changes (in temperature, precipitations etc.) are usually presented as **relative to a reference** !!

The Challenge: What do we provide?

Visit our GitHub page!
https://github.com/hack-with-admin-ch/HackZurich2022

- CH2018 climate projections data
- Notebooks with examples:
  - How to access / load different data files
  - How to access and process swissSURFACE3D geodata
  - How to use and visualize the climate scenario data
- Links to historical climate data
- Link to population scenario data

The Challenge: Make Climate Change Tangible for Swiss Citizens

You can tackle the challenge from different angles:

Adopt a historical perspective:

Based on historical data, how has climate change changed our lives and our environment in recent years?

Adopt a forward-looking perspective:

Based on the official CH2018 climate scenarios, what's our future going to «feel» like?

- Create a user-friendly tool for:
  - Simple or interactive visualization of climate changes (for the whole of Switzerland, or for a specific city or region)
  - Easy access to / understanding of open climate data
- Imagine an AR / VR solution
- Create a game
- Think of innovative infographics that inform and help lower the barrier of «low sense of urgency»
- …

We need your talent!

Judging Criteria

- **Value:** Does your solution make a difference to citizens? Does it create value?
- **Creativity:** Does your solution convey information in an innovative / striking way? Thinking outside the box is encouraged!
- **Execution:** Is your solution well designed? Is it usable in its current state? Does everything appear to work?
- **Presentation:** Is your video pitch convincing, does it enhance the technical value of your hack?
- **Trustworthiness:** Is your solution well documented? Have you acknowledged data sources? If assumptions were made, have you clearly stated them?

What's in it for you?

- Support from experts (developers, data scientists, data engineers)
- Hack for public good: create value from a rich source of publicly funded open data
- We have open positions – get in touch! Visit our booth and the HackZH job wall: https://hackzurich.com/jobs