

## Announcements on Spatial Climate Datasets

October 2021

### About this newsletter



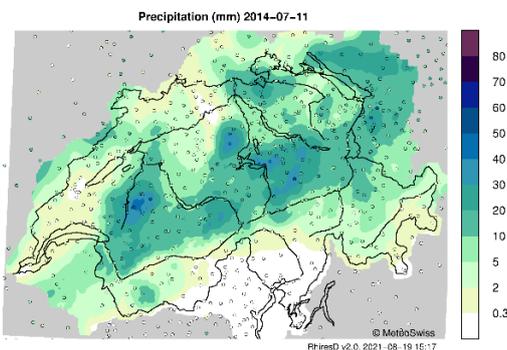
Data services offered by MeteoSwiss are continuously extended and the procedures of processing and delivery need occasional adjustment to the evolving technical infrastructure. This newsletter is meant to communicate these developments to users. The purpose is to inform about newly installed and renovated data products, and to prepare users for upcoming technical changes. Some of the changes may require adaptation or testing by service recipients, which is why the news are provided well ahead of time. We try to keep the announcements compact. For additional and more specific information, we recommend to consult the

[MeteoSwiss Products web-page](#), and specifically for this Newsletter, the [Spatial Climate Analysis web-page](#). To facilitate technical adjustments on the user side, we also provide example datasets on that same web-page.

The present issue of the newsletter introduces a series of renewals and adjustments for which users have expressed interest during our last users' workshop and in personal communication. Most importantly, we can present first results on the widely expressed interest for an extension of the domain to hydrological Switzerland (see below). And we can announce that the format consistency between bulk and real-time deliveries has been improved.

If you wish to receive this newsletter in the future, or have not received this issue, please mail the [customer service](#) to be added to the mailing list.

### Renovation of the daily precipitation dataset RhiresD

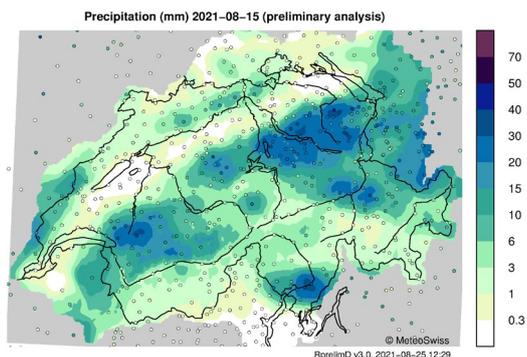


A new version of the daily precipitation analysis RhiresD has been created that extends over the domain of "hydrological Switzerland". The domain newly encompasses areas outside the national border that are hydrologically connected. For this purpose, the analysis incorporates rain-gauge measurements provided by national and regional weather services in our neighbor countries. These also strengthen the precipitation analysis in near-border regions within Switzerland. The renovated RhiresD dataset is produced with a climatological background that was adjusted locally in the Jungfrau region, to avoid unrealistic values there (see "Modifications of

precipitation datasets in general" further below). The new version "v2.0" is processed back in time till 1961, and will become operational on 1. December 2021. It is available both in the longitude-latitude and in the Swiss coordinates grid. Current users of RhiresD will have to take into account that the coordinate window, and hence the grid dimensions, are larger compared to the earlier version, which may need technical adaptations. Example data files of RhiresD v2.0 are available on the [Spatial Climate Analysis web page \(section "Renovations"\)](#). A bulk delivery of the renewed dataset can be requested from the [customer service](#). We plan a similar domain extension for our temperature analysis (TabsD).

The density of the foreign station networks available for RhiresD is heterogenous in time and space. Back until about 2005, the density is comparable to that in Switzerland, but it becomes gradually coarser further back in time. Before 1992, data for the region of Piemonte (i.e. for Valle d'Ossola) is missing altogether and for the section over France it is very coarse. To avoid undue extrapolation, the Italian and French parts of the domain have been masked out (i.e., set to NA) before 1992. Finally, before 1971, the data density is less than a fifth of that in Switzerland, also over the German and Austrian sectors, which implies clearly inferior quality and considerable smoothing in these regions in the first decade of the dataset. We have noted that the quality standards of the foreign data is mixed. This bares a certain risk that the analysis is contaminated by gross errors near or beyond the border.

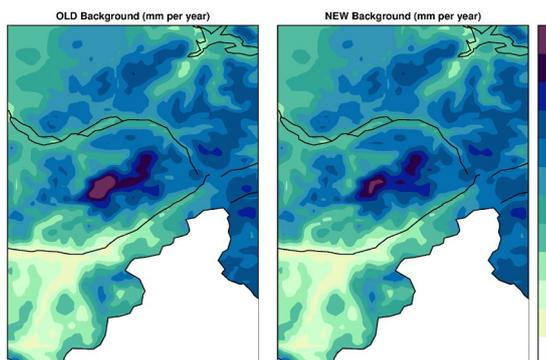
## Renovation of the real-time precipitation dataset RprelimD



For the real-time daily precipitation dataset RprelimD we have employed, so far, a statistical reconstruction method with measurements from long-term stations only. This concept is abandoned in the new version (v3.0). The continuous automation of rain-gauge measurements over the past 10 years, has increased real-time availability in a way that direct interpolation with available data is feasible and more beneficial than reconstruction. The new version of RprelimD is designed to be methodologically similar to RhiresD v2.0, but processed with the limited data input of measurements available at analysis time. As a result, and in

contrast to the previous version, RprelimD is indeed a preliminary estimate of RhiresD. There is approximately 60% of the rain-gauge measurements available at the latest daily analysis time (11:00 UTC). The present version of RprelimD shares the extensions implemented in RhiresD (see above), that is a coverage of “hydrological Switzerland” and the inclusion of foreign rain-gauge data. The methodological switch is well visible in the fields. They exhibit a larger spatial variance, and, thanks to the denser station data, resolve patterns at smaller scales. The reduced filtering, however, also implies a stronger sensitivity to gross errors and poorly representative measurements.

## Modifications of precipitation datasets in general



With the renewal of RhiresD and RprelimD we have implemented two methodological modifications also to all other precipitation datasets, mostly for reasons of consistency. This concerns the monthly and yearly datasets (RhiresM, RhiresY), as well as the norm value fields (RnormY6190, etc.):

Firstly, an adjustment has been made in the weighting scheme of the interpolation. Its purpose is for RhiresD to better cope with the stronger gradients in station density that have emerged with the domain extension. This modification is now similarly adopted in all other datasets for internal consistency.

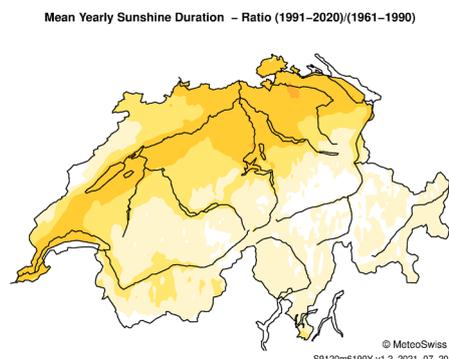
For areas within Switzerland, the effect is mostly small, barely

noticeable in most cases, but it is sometimes evident in a slightly stronger spatial smoothing.

Secondly, a modification is made to the climatological background field that is used in the analysis. The modification is local, in a circular area of diameter 50 km, centered over the Jungfrau massif. Within the area, the background mean precipitation is manually reduced in order to correct for unrealistic precipitation estimates due to an implausible totalizer measurement in the original analysis. In the center of the area, the reduction is 23% for the annual total (25% in summer, 13% in winter) and it gradually decreases away from the center. There is considerable uncertainty about precipitation at high altitudes, but the exceptional mean precipitation in our analyses for the Jungfrau region seemed unrealistic. The present ad-hoc manipulation aims at correcting this.

All the precipitation products have been reprocessed under version “v2.0”. We recommend users to request a bulk delivery from our [customer service](#) to upgrade their data archives. Operational delivery will switch to “v2.0” on 1. December 2021.

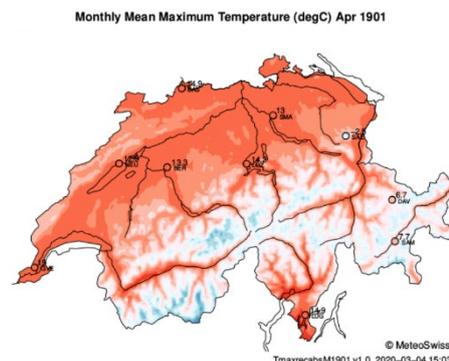
## Data products for the new climate norm 1991–2020



MeteoSwiss communicates elementary characteristics of the current climate in Switzerland based on observations over a 30-year period. As of January 2021, the definition of this norm period changes from 1981–2010 to 1991–2020, in accord with recommendations of WMO. This change will be implemented also for the spatial climate datasets. New spatial data products will therefore become available. These include fields of the new norm values, such as the mean annual precipitation total (denoted as RnormY9120), analyses of the anomaly from the norm, such as the sunshine duration of last month in relation to the norm (SanomM9120), as well as maps of the difference between norm periods, such as the change of mean annual temperature from

1961–1990 to 1991–2020 (T9120m6190Y). Finally, the long-term climate monitoring datasets will be re-calculated with the new homogenous station data and anomalies expressed with respect to the new norm period (i.e. Rrecanom8110Y1864 superseded by Rrecanom9120Y1864). Users should note that all regular data deliveries of anomaly products will switch to the new norm period starting in February 2022. Acronyms and short descriptions of all new datasets are listed in the section [Spatial Climate Analysis](#) of the MeteoSwiss web page. Data products referring to the present reference 1981–2010 will be discontinued after June 2022. Products referring to the old reference 1961–1990 will, however, be continued and regularly updated, because they are frequently used to visualize recent climatic changes.

## New products: Minimum and Maximum Temperature from 1901



The long-term climate monitoring datasets for temperature and precipitation, which reconstruct the monthly fields up to 1864, are now supplemented with similar reconstructions for monthly mean daily minimum and daily maximum temperature. Thus it is possible to go back to the beginning of the last century. The datasets satisfy high standards in temporal consistency. Two variants are available, either starting from 1901 or from 1961 (the latter uses more stations for reconstruction). The period before 1901 was not reconstructed due to insufficient measurements.

For all products, we determine the absolute values as well as the anomalies expressed with respect to the new norm period 1991–

2020 and the trends over the whole reconstructed period. Product documentation is available in the section [Spatial Climate Analysis](#) of the MeteoSwiss web page (product names starting with Tmaxrec and Tminrec). The next development will be the reconstruction of the monthly sunshine duration of the last century.

## NetCDF Format consistency of data delivery improved



From 1 December 2021, the automatically distributed data will be made available in an improved NetCDF format. The format follows the NetCDF [Climate and Forecast \(CF\) Metadata Conventions](#). This guarantees consistency of data formatting between automatically distributed data and data from our long term archives. For norm data, a climatological time axis will be added in accordance with the CF metadata conventions. Examples can be found in the section “Renovations” of the [Spatial Climate Analysis page](#) of the MeteoSwiss web page. Users receiving grid data in the GeoTIFF or ASCII format

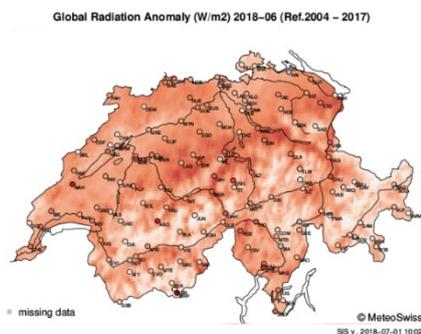
will not be affected by the change. We however motivate all users to consider NetCDF since it offers superior metadata to the other formats. Example NetCDF files are available in the section [Spatial Climate Analysis](#) of the MeteoSwiss web page.

## New Swiss coordinate system LV95 – CH1903+



From 1 December 2021, the climate data in Swiss coordinate grids will be made available in the [new Swiss coordinate system LV95 - CH1903+](#). The previous Swiss coordinate system LV03 – CH1903 will not be served any more. For km-scale datasets the change simply means adding 1'000'000 to the N-S coordinates and 2'000'000 to the W-E coordinates. Examples including the new coordinate system are provided under section “Renovations” of the [Spatial Climate Analysis page](#) of the MeteoSwiss Web.

## New calculation software for solar radiation grids

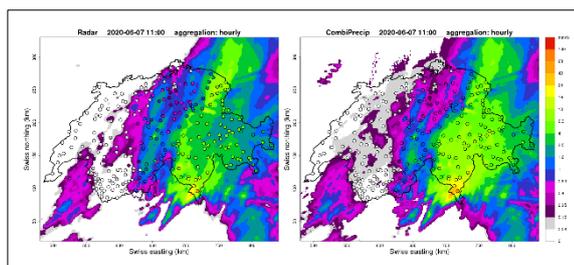


The calculation of the solar radiation grids, radiation components and other related variables is now performed by the Geosatclim software. The new datasets have been carefully evaluated with in situ measurements and compared with datasets of our previous software called Heliomont. The new data will be distributed with version numbers 2.6. Changes will become operational on 1. December 2021.

A few changes have been introduced with the switch:

- In addition to the daily, monthly and yearly means, the aggregated hourly mean global radiation and its components were added as new available variables for ordering through our customer service.
- New horizon-free variables were added for users who would like to calculate their own radiation fields.
- Cloud Fractional Cover (CFC) was added, comparable to synoptic observations from the ground.
- We have improved the calculation performance so that our algorithm can now run over the full Meteosat field of view. Data will be available via the Satellite Application Facility on Climate Monitoring ([CM SAF](#)).
- It is planned to extend the radiation grids back to 1983 when first Meteosat data became available. This extension will include a good performance over snow with only two channels in operation.

## CombiPrecip homogenized database 2005-Present

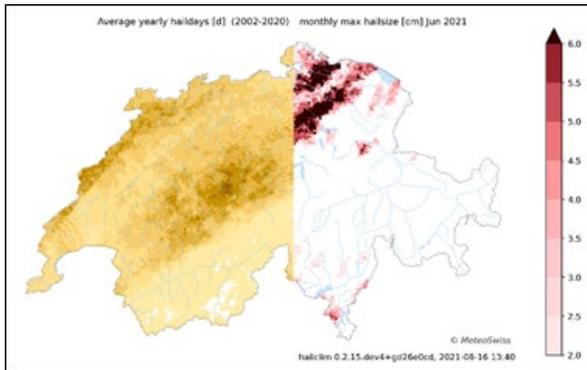


CombiPrecip performs the real-time combination of radar estimation and raingauge measurements of precipitation of MeteoSwiss. It has been operational since 2012 and is based on geostatistics. A number of fixes were introduced within the latest version 3.5 in order to improve the combination process and its speed. The most important aspect is that this new engine has been employed to reprocess the entire CombiPrecip product from 2005 to present. The result is a

completely homogenized product. Prior to this version the CombiPrecip time series available to customers was inhomogeneous, in the sense that different parts of the archive had been computed by successive but slightly different versions of CombiPrecip. The MeteoSwiss DataWarehouse currently hosts two aggregations of the

CombiPrecip data, the hourly (24 per day) and the daily one. It is worth reminding that the natural aggregation in which CombiPrecip operates is the hourly one, while the daily product is simply an aggregation of the 24 hourly time steps.

## New radar hail climatology (2002-2020) released



Since May 2021, climate information on the occurrence of hail in Switzerland complements the MeteoSwiss portfolio of gridded climate datasets. In the three-year project, the radar hail archive was thoroughly improved and reprocessed. The new climate products were developed in close collaboration with stakeholders from the public and private sectors in a public-private partnership. Besides monthly and yearly datasets of the number of hail days and the maximum expected severe hailstone size per square kilometer, long-term averages of the monthly and yearly hail indices are available. Furthermore, return values of radar-derived hail

stone sizes were estimated for different return periods using a statistical resampling approach based on more than 30'000 highly resolved hail storm footprints. The hail climatology data are provided in 1 km x 1 km spatial resolution and are freely available for the convective seasons (April to September) since 2002 and will be updated regularly. Daily and five-minute data of the two radar hail algorithms Probability of Hail (POH) and Maximum Expected Severe Hail Size (MESHS) are now available from the MeteoSwiss DataWarehouse and can be ordered by customers. Further information about data and background of the hail climatology Switzerland can be found at [www.hailclimatology.ch](http://www.hailclimatology.ch).

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