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Quantitative Information on Extreme Precipitation

A new Climate Service for Switzerland

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*Federal Office of Meteorology and Climatology MeteoSwiss, Climate Division,
Switzerland*



May 2016

Zürich 13° ▼

Suche Anmelden

Blick

Home News Sport People Ratgeber Life Gesundheit Auto Star des Tages Video Erotik Services

Wetter beruhigt sich – Gefahr von Erdrutschen bleibt

Die Schweiz versinkt im Hochwasser

In der ganzen Schweiz regnete es seit Donnerstag praktisch ununterbrochen. Meistenorts hat es während der letzten Tage so viel Regen gegeben, wie durchschnittlich in einem ganzen Monat Mai. Da es heute mehrheitlich trocken



MeteoSwiss

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Types of User Demands

Event Qualification:

Insurance claims, Media,...

→ Past: How severe was the event? How rare are 80mm/day in Berne?

→ Return period

Design:

Emergency planning, hazard maps, flood prevention, sewage/drainage, ...

→ Future: What amount is exceeded on average every 100yrs ?

→ Return level/value?





Outline

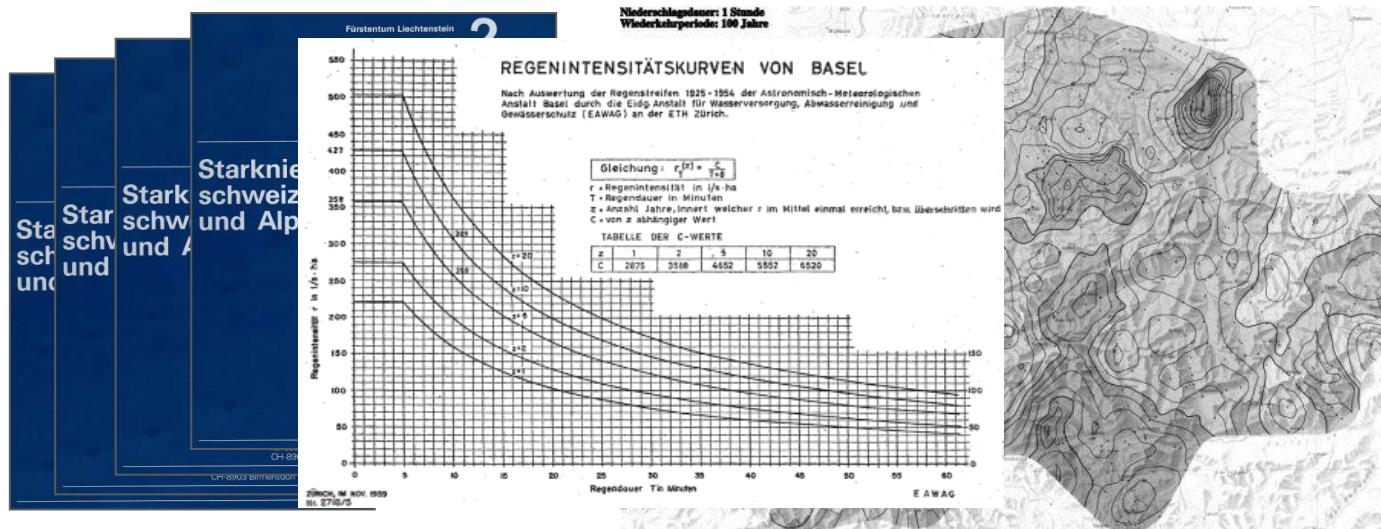
- Establishing the Service
 - Users' needs
 - Types of applications addressed
 - New features
- Web platform
- Logistics and Communication
- First Experiences
- Future extensions





Situation up to about 2013

- Analogue Statistics available (time-consuming analyses needed)
 - No uniform methodology or data ; single stations
 - out-of-date (no updates available or planned)
 - Statistics in higher temporal resolution missing
- Updated and consistent basis to qualify events or dimensioning was missing.



„Blaue Bände“

Example: Extremvalue statistics from HADES

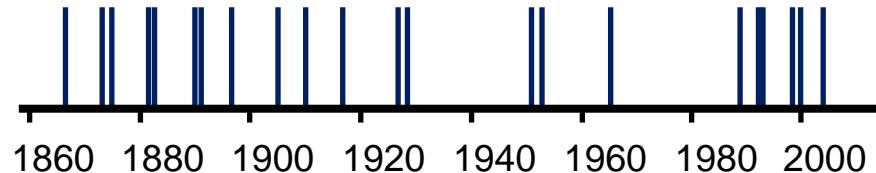




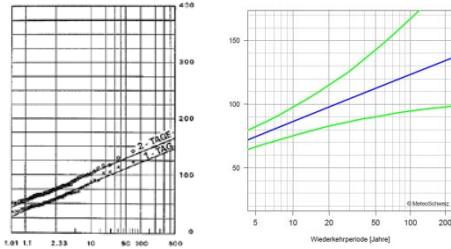
Goals of Project (2013-2015)

Users' Needs

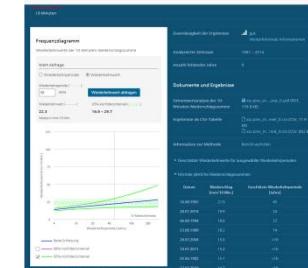
Data basis



Methodology



Form



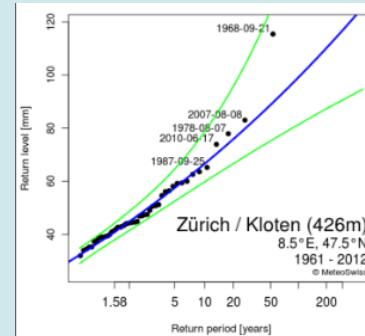


Tasks for MeteoSwiss

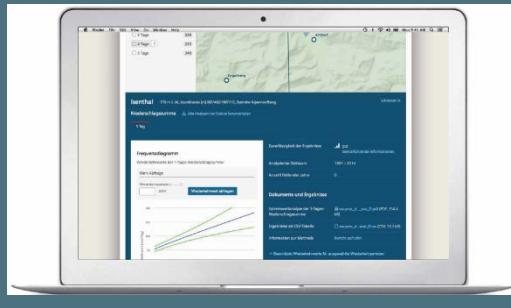
Task 1: Provision and Analysis of climatological basis

```
parameter station time value
rre150d0 MUT 196101010000 3
rre150d0 MUT 196101020000 5.1
rre150d0 MUT 196101030000 11.5
rre150d0 MUT 196101040000 1.2
rre150d0 MUT 196101050000 0
rre150d0 MUT 196101060000 3.2
rre150d0 MUT 196101070000 0
rre150d0 MUT 196101080000 1.8
rre150d0 MUT 196101090000 1.1
rre150d0 MUT 196101100000 3.9
```

Task 2: Develop and implement state-of-the-art methodology



Task 3: Design Web-Portal geared towards users' needs



Task 4: Concept for sustainable solution

- Regular updates
- New precip parameters
- Include further parameters in future

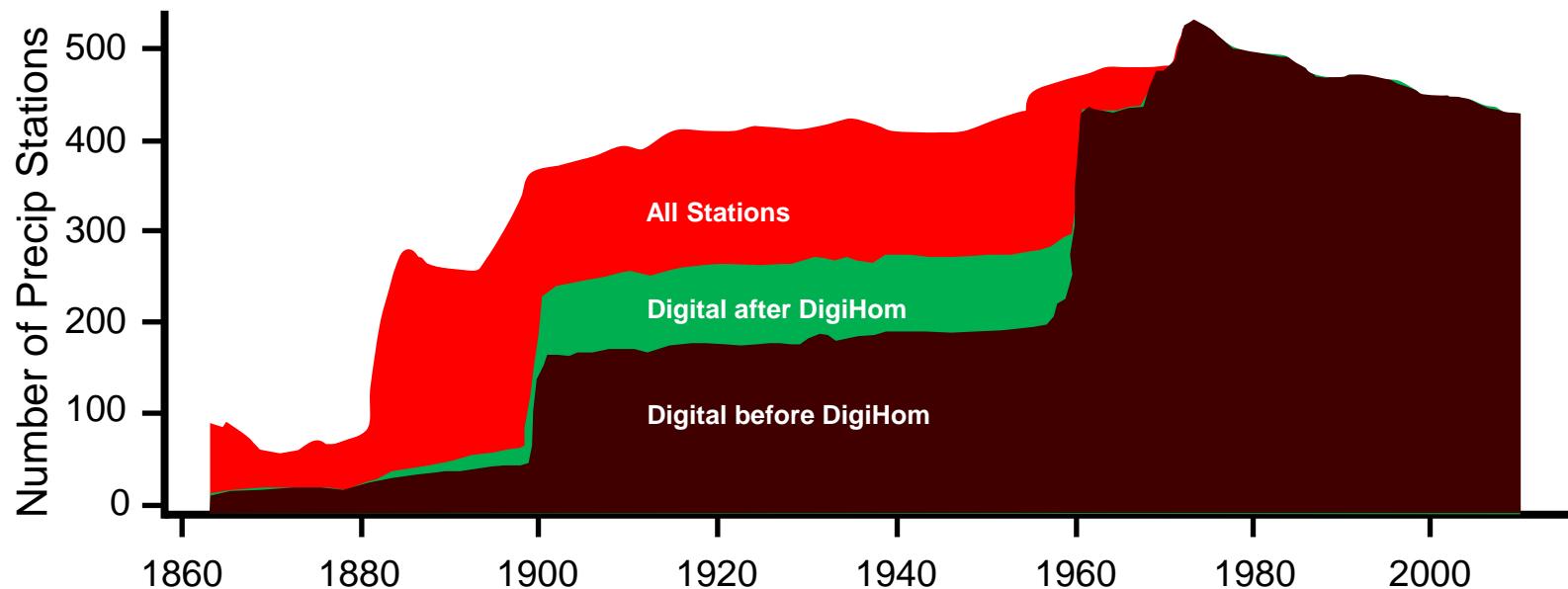




Task 1: Data Basis

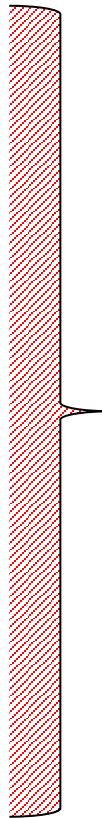
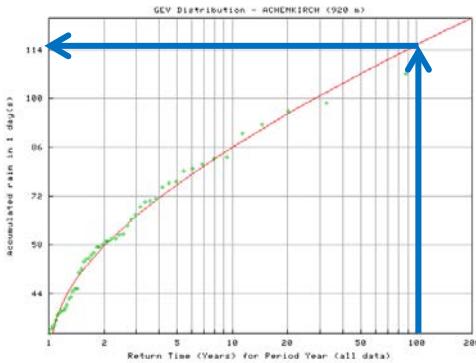
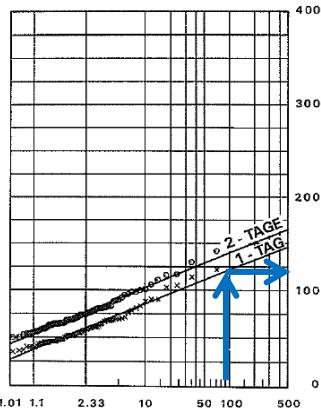
Update and Expand the Datasets

- Quantitative: Digitalise historical datasets
- Qualitative: Verify extremes

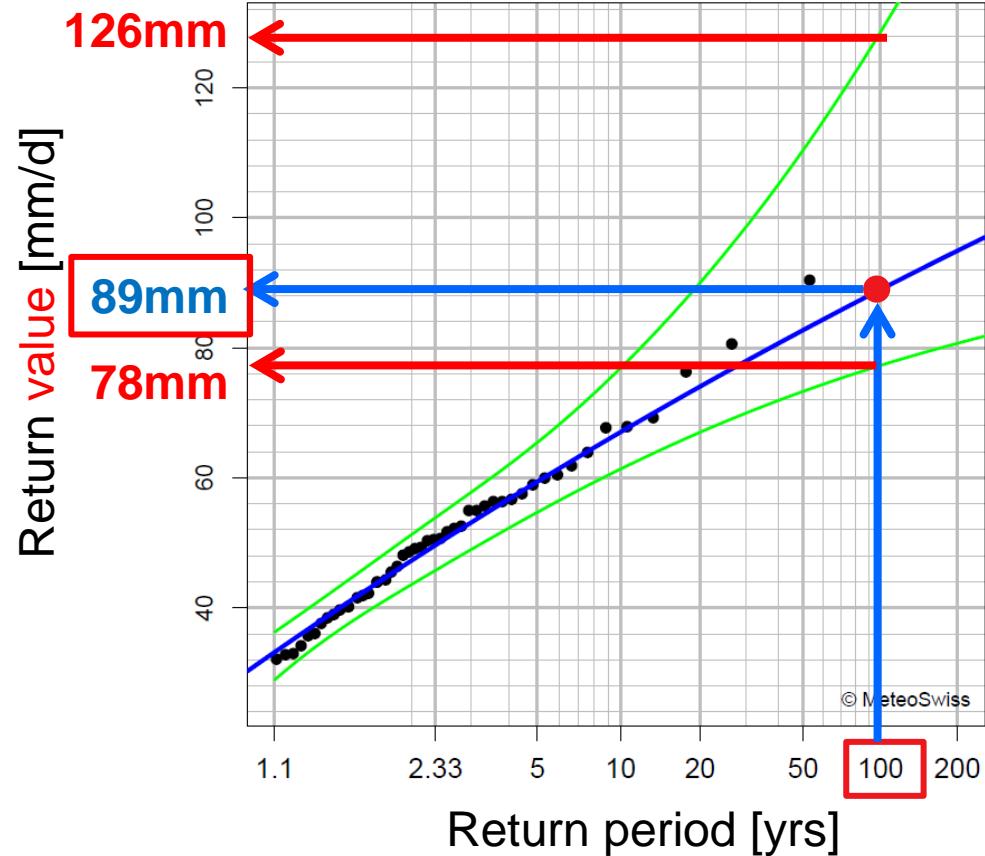




Task 2: Update Methodologies



Bern-Zollikofen

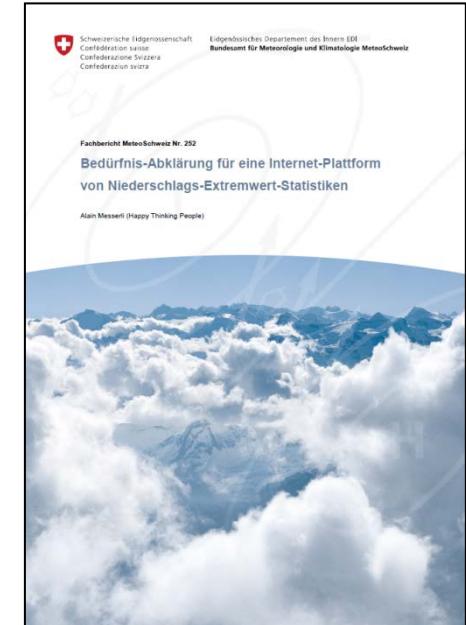




Task 3: Users' needs

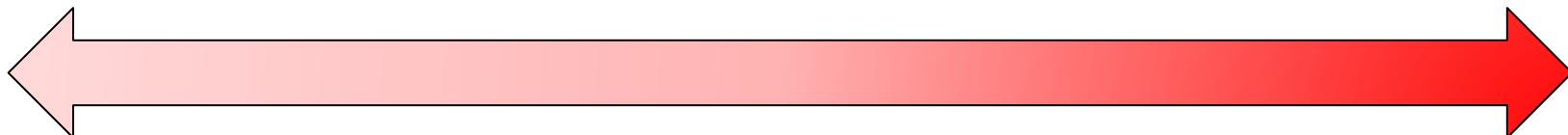
Procedure

- Market research consultants *Happy Thinking People*
- 12 interviews with experts and users of extreme precipitation analyses (e.g. federal agencies, regional planners, plumbers, engineers, ...)
- in the 3 language regions of Switzerland
- Purpose: understand information sources, workflow, wish list for climate service



MeteoSwiss Technical Report 252, 2014

Extensive Users



- Simple search: «one number»
- Event time-series

Intensive Users

- Complete data
- Tool box





Task 3: New Webportal

<http://www.meteoswiss.ch/climate-extremes>

The screenshot shows a laptop displaying the MeteoSwiss climate extremes website. The map view highlights locations like Altdorf, Engelberg, and Isenthal. The Isenthal station card is open, showing a frequency diagram for 1-day precipitation sums. The diagram plots return periods (in years) against precipitation amounts (in mm/day). A blue line represents the estimated values, and green lines show confidence intervals. The card also includes details about the analysis period (1901–2014), zero missing years, and links to reports and CSV data.





Task 4: Sustainability

- Specialist know-how remains available (1PE)
- Webplatform :
 - integrated on MeteoSwiss website (ensures maintenance and updates)
 - data and Information regularly updated
 - can be extended to further parameters / products
- Stakeholder Network established
- **Continued dialogue with Stakeholders**
=> User forums, Newsletter, Implementation of Feedbacks





The new Webportal

Federal administration > Department: FDHA > Federal Office: MeteoSwiss

Hazards Career and Job Media Contact DE FR IT EN

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Confédération suisse
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Federal Office of Meteorology and Climatology MeteoSwiss

Topics A-Z

Latest news Weather Climate Measurement & forecasting systems Research & cooperation Services & publications About us

Homepage > Climate > Past > Climate Extremes > Extreme value analyses (version 2016)

← back to «Climate Extremes»

Extreme value analyses (version 2016)

Print page

Access organized by period of analysis appropriate for potential use.

Standard period 1966 - 2015

Examples of use: compare stations or classify observed events. Use this approach when more than one point in space or time is of interest.

Periods of analysis

1966 - 2015 (daily sums): prospective update 2021
1981 onwards (min./hourly sums): prospective update 2017

Longest period

Examples of use: single, local design. Use this approach in the context of specific, spatially and temporally confined applications.

Period of analysis

From the earliest measurements onwards: yearly updates

Background information

- Examples of use
- Station information
- Good to know
- Methodological information
- Studies and literature

Historical events

- High impact precipitation events
- Hyetographs (data of the heaviest precipitation events per station)

Climatology of heavy precipitation

Spatial patterns, seasonality, empirical indices





The new Webportal

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Search bar Topics A-Z

Extrem value analyses

Extreme value analyses (version 2016)

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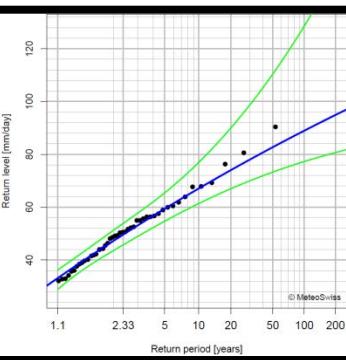
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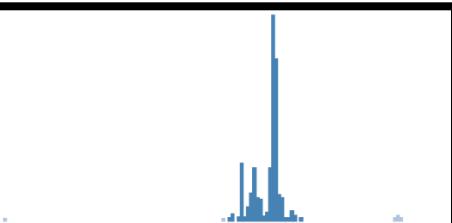
Period of analysis

From the earliest measurements onwards: yearly updates



Print page

Precipitation time series

- Examples of use
 - Station information
 - Good to know
 - Methodological information
 - Studies and literature
- 

Historical events

- High impact precipitation events
- Hyetographs (data of the heaviest precipitation events per station)

Climatology of heavy precipitation

Spatial patterns, seasonality, empirical indices





New Features

Standard Period (1966-2015): Comparisons in time and space

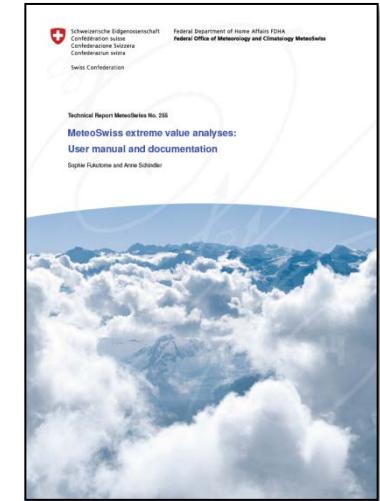
- Schaffhausen, 18.5.1994, 97 mm/day (44 years)
- Schaffhausen, 20.7.1932, 94 mm/day (38 years)
- Lugano, 21.8.1911, 263 mm/day (>300 years)

Quality of Fit



Statistical details explained

MeteoSwiss
Technical Report 255,
2015



Confidence Intervals: not considered of practical use by some users

Time series of specific heavy precipitation events





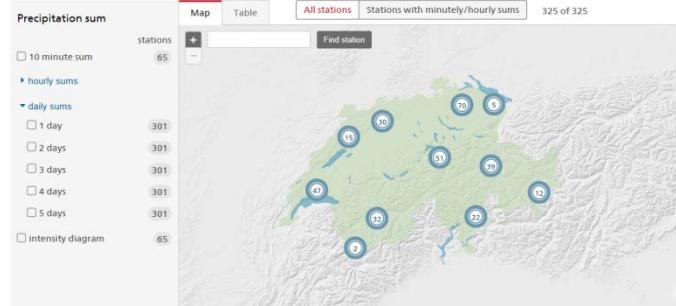
Website Standard & Longest Period

Standard period 1966 - 2015

Examples of use: compare stations or classify observed events. Use this approach when more than one point in space or time is of interest.

Periods of analysis

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1981 onwards (min./hourly sums): prospective update 2017



Longest period

Examples of use: single, local design. Use this approach in the context of specific, spatially and temporally confined applications.

Period of analysis

From the earliest measurements onwards: yearly updates



Update:

Every ~5 years.

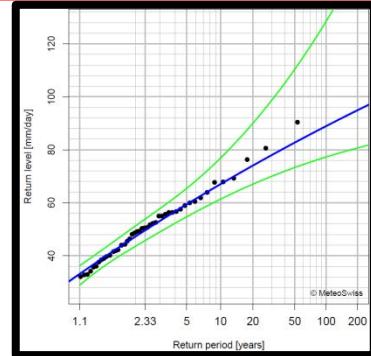
Version 2016: 1966 – 2015

Version 2021: 1971 – 2020

Enables **comparison of events** at different locations and times

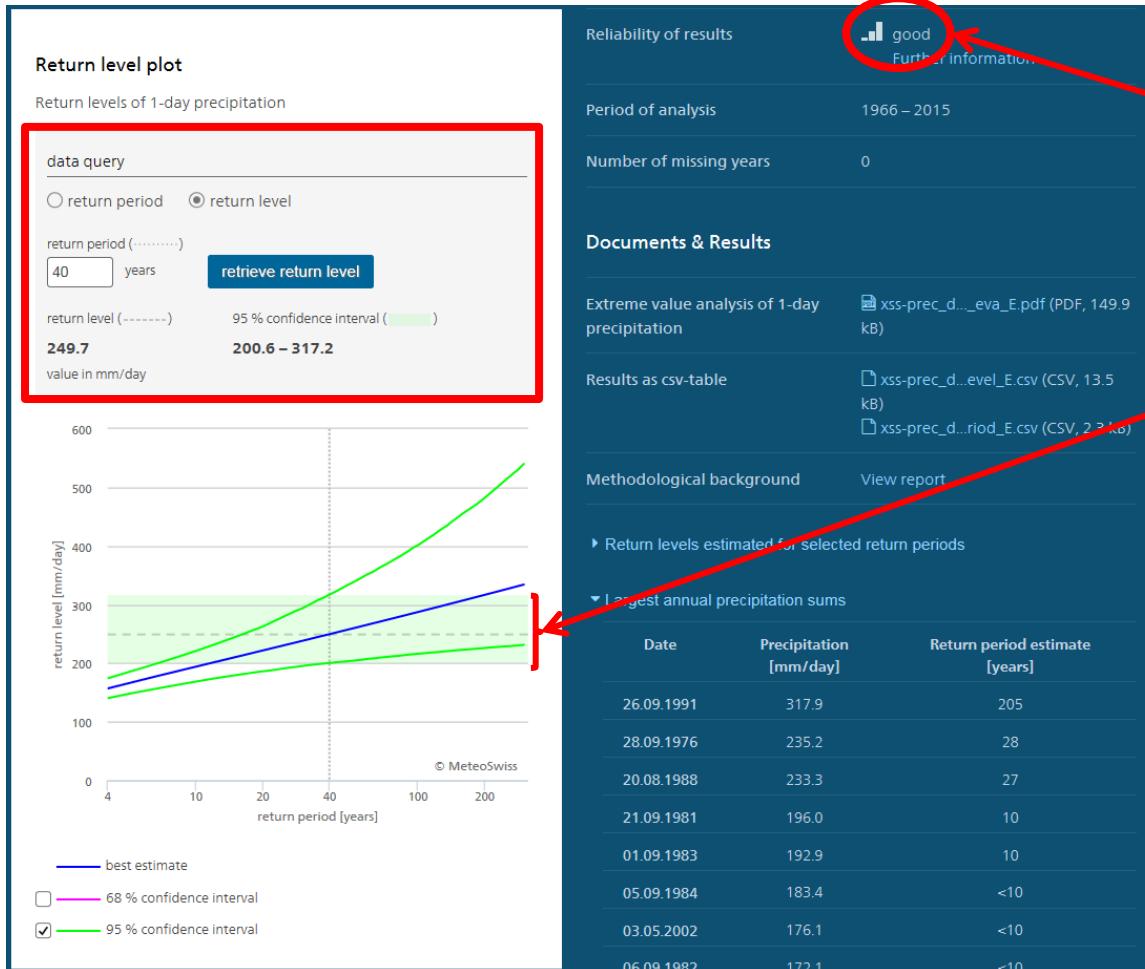
Update:

Every year





Website: Analyses and Interface



Quality of fit: good

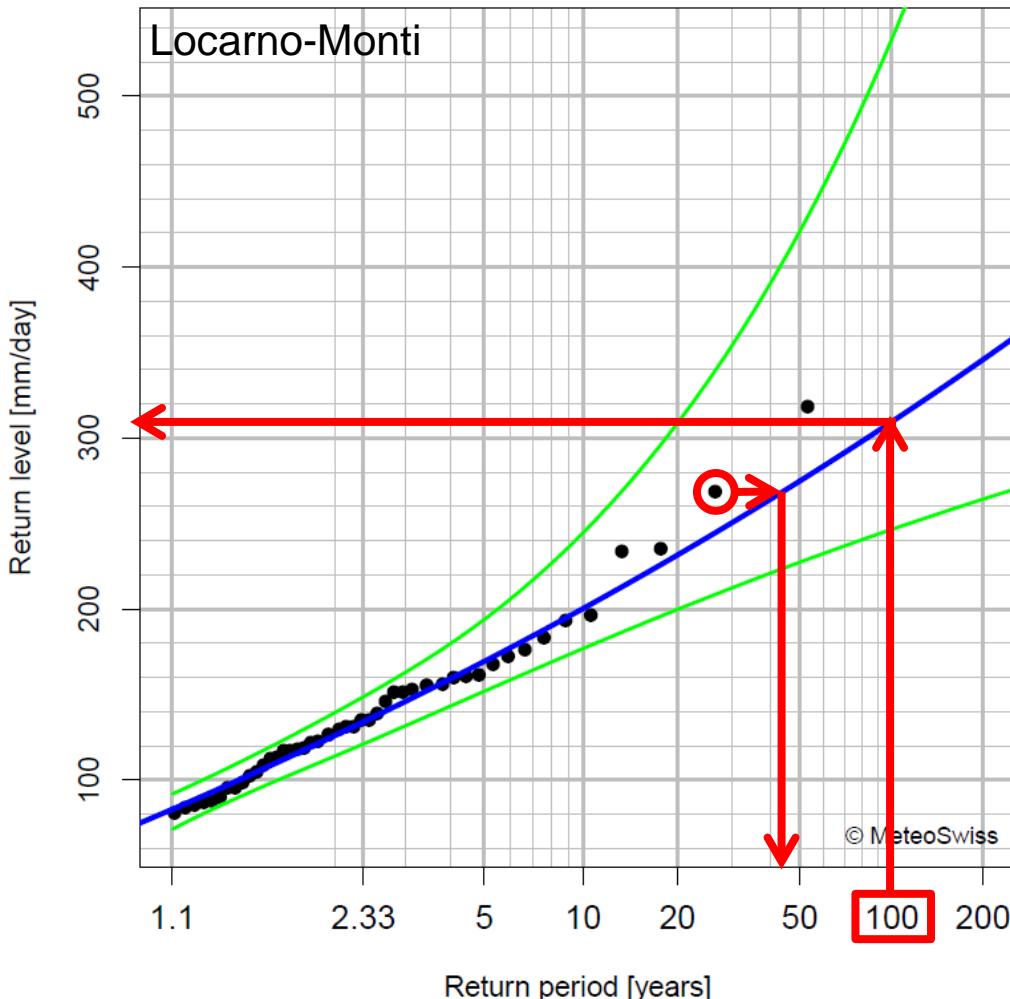
Confidence intervals





Types of Applications (Examples)

Return level plot



Design:

100-year precipitation amount?
310 (220, 520) mm/day
(95% Confidence Intervals)

Qualification:

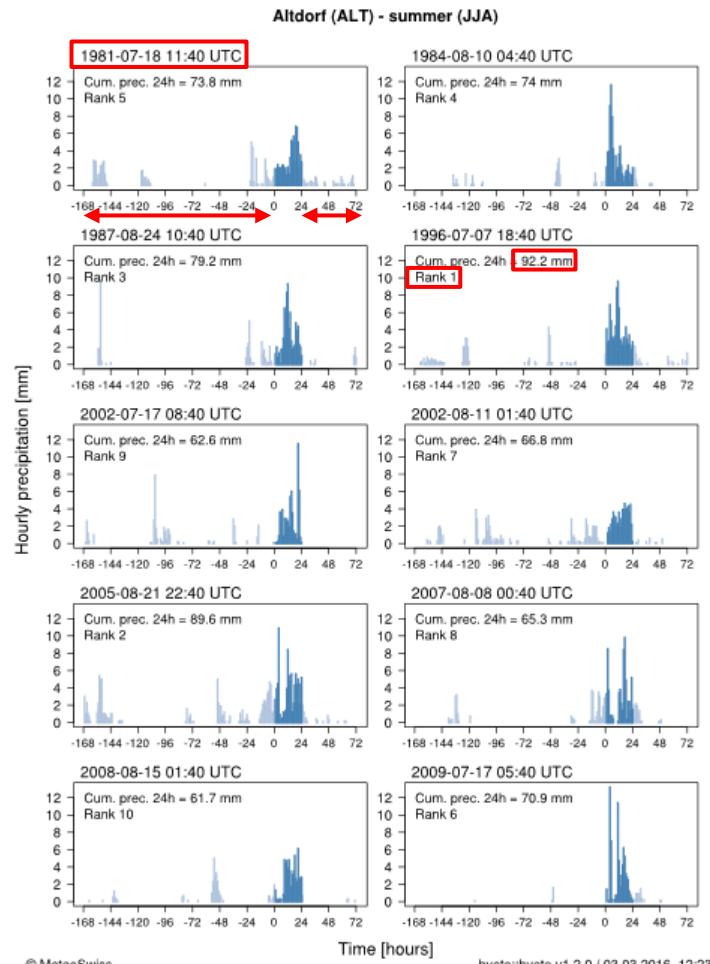
Event dated 9.9.1965:
269 mm/day. How rare?
30 – 60 years
(Sensitivity of results)





Hyetographs

Hyetographs



Altdorf

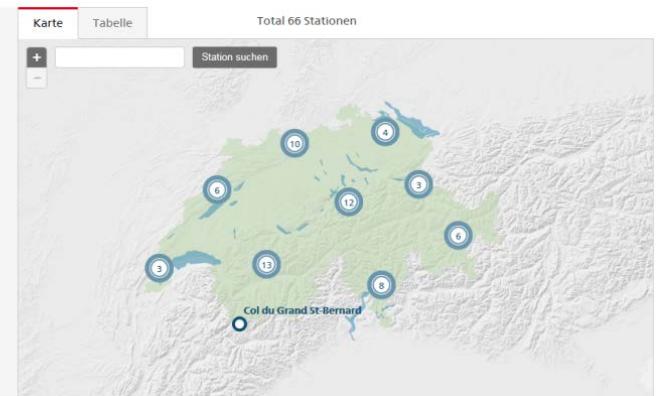
24 hours

Hyetogramme

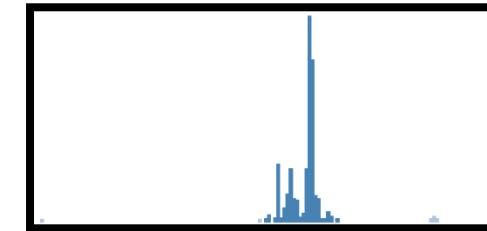
Hyetogramme der 10 grössten Ereignisse der 1-, 4-, 8-, 12-, 24- sowie 48-Stundensummen.

Jahreszeit

- Gesamtes Jahr
- Winter
- Frühling
- Sommer
- Herbst



- ~65 Stations
- Durations 1h, 2h, 4h, 8h, 12h, 24h, 48h
- Entire year, 4 seasons



Hydrological models

Seite drucken





User Experience and Feedbacks

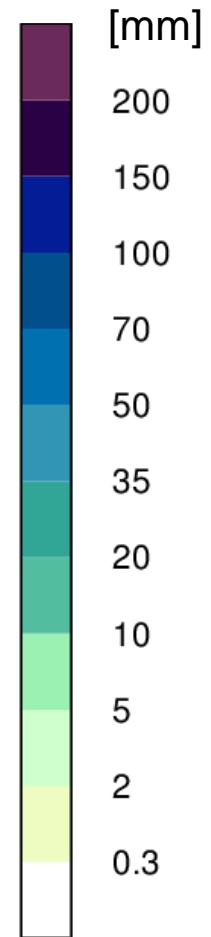
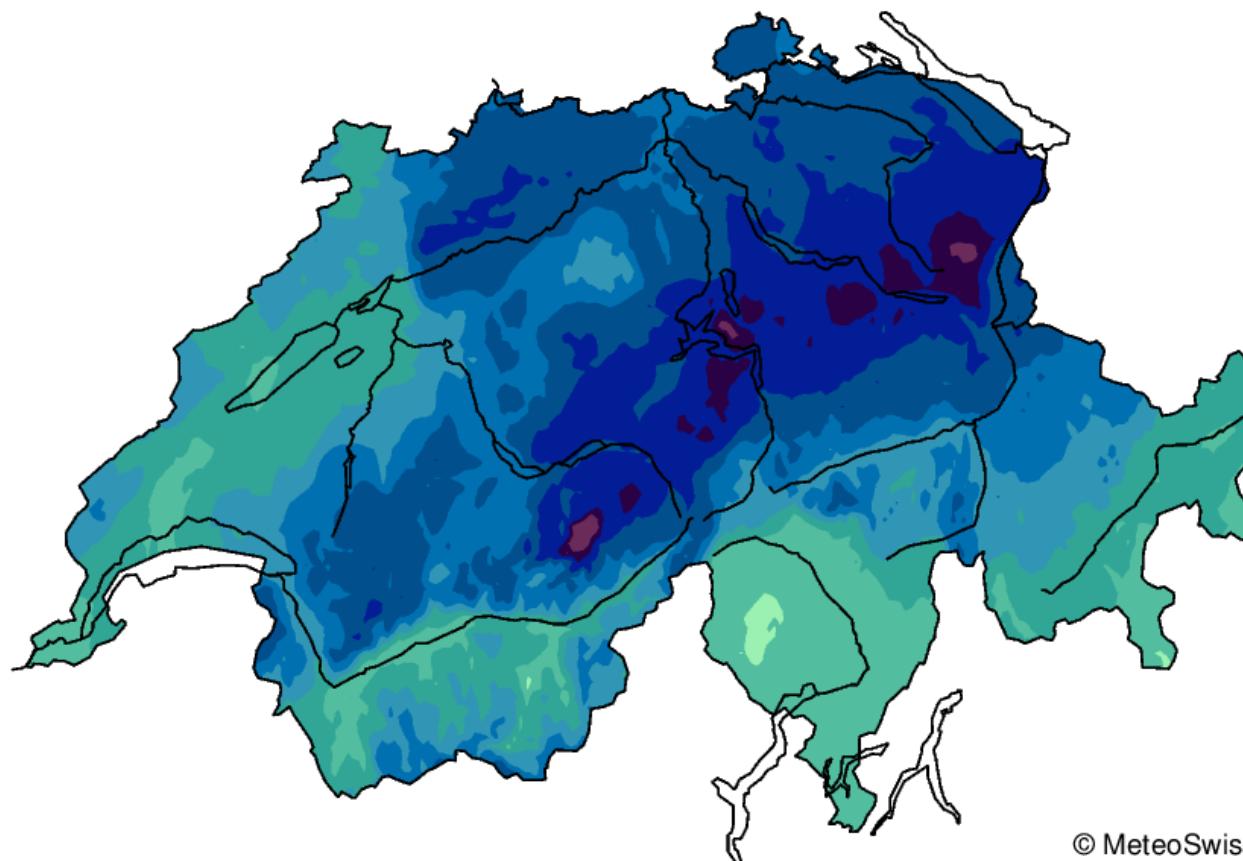
- Stakeholder event for launch of Website
- Training and instruction available – also internally
- In hydrological community already widely used
- Engineers and practitioners: legislation (building norms) most relevant → best to integrate results in revision of norms
- Very frequently used internally at MeteoSwiss (warnings, event qualification, media, expertises,...)





May 2016

Precipitation Sum 12.-14.05. 2016



© MeteoSwiss
2016-05-17

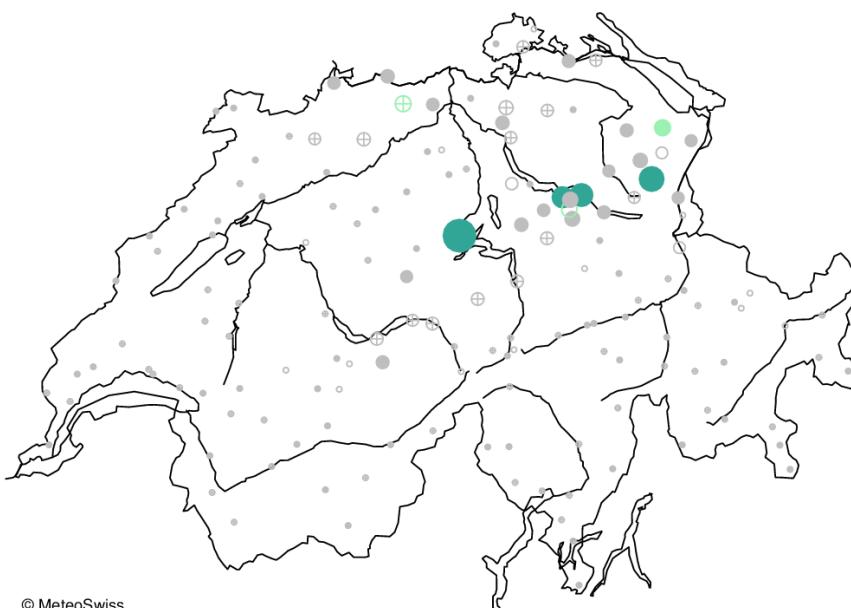




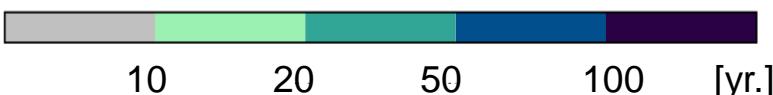
First Event to use new EVA in operation

event 12.05 -14.05.
thunderstorm 14.05., 2h-Sum

→ 3-8 yr event, locally 20-50 yr.
→ 5-10 yr., saturated soils!



© MeteoSwiss



Station	[m a.s.l.]	[mm]	[years]	[years]
Aadorf / Tänikon (IAE)	539	80.2	1.1 - 3	
Eschenz (ESZ)	414	81.9	3 - 8	
Flawil (FLW)	570	104.1	3 - 8	
Hallau (HLL)	419	77.5	2 - 5	
Lohn, SH (LOH)	585	55.1	1.1 - 3	
Salen-Reutenen (HAI)	718	79.2	2 - 5	
Schaffhausen (SHA)	438	79.4	2 - 5	
Siebnen (SIE)	452	128.1	8 - 12	10 - 20
Sihlbrugg (SIH)	549	113.4	3 - 8	
St. Gallen (STG)	776	128.3	> 10	10 - 20
Wädenswil (WAE)	485	91.6	1.1 - 3	
Winterthur-Seen (WIN)	506	93.4	2 - 5	
Zürich / Affoltern (REH)	444	89.6	3 - 8	
Zürich / Fluntern (SMA)	556	97.0	3 - 8	
Zürich / Kloten (KLO)	426	94.1	5 - 10	

empirisch EVA

→ Compared well with return levels
from hydrological run-off models





Logistics and Communication

- Production
 - Automatic, from Data Warehouse to products.
 - Extreme Value Analyses: About 400 stations, 16 precipitation durations, Standard and Longest Period, 4 languages → Nearly 200'000 files
 - Hyetographs: 65 stations, 7 durations, 5 «block sizes», 4 languages → About 20'000 files
- Federal Organisation
 - Transparency & Reproducibility
- Communication
 - Within MeteoSwiss (workshops)
 - User Community (newsletters, exclusive interview NZZ, presentations at conferences, events, brochure)





Thank you !

www.meteoswiss.ch/climate-extremes



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Dipartimento federale dell'interno DFI
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Office fédéral de météorologie et de climatologie MétéoSuisse
Ufficio federale di meteorologia e climatologia MeteoSvizzera
Federal Office of Meteorology and Climatology MeteoSwiss



Extreme Niederschläge

Neue Grundlagen für die Planung und Einordnung in der Praxis





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