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Eidgenössisches Departement des Innern EDI
Bundesamt für Meteorologie und Klimatologie MeteoSchweiz

Automating Peak-over-Threshold with the Information Matrix Test

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MeteoSwiss

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Outline

- Task
- Information Matrix Test → what does it test?
- Algorithm → how do we use it?
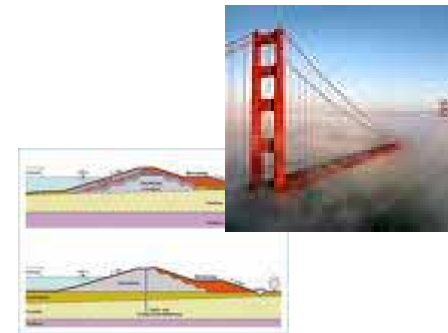- Applications → daily, hourly precipitation

Task

warnings

media

insurance business

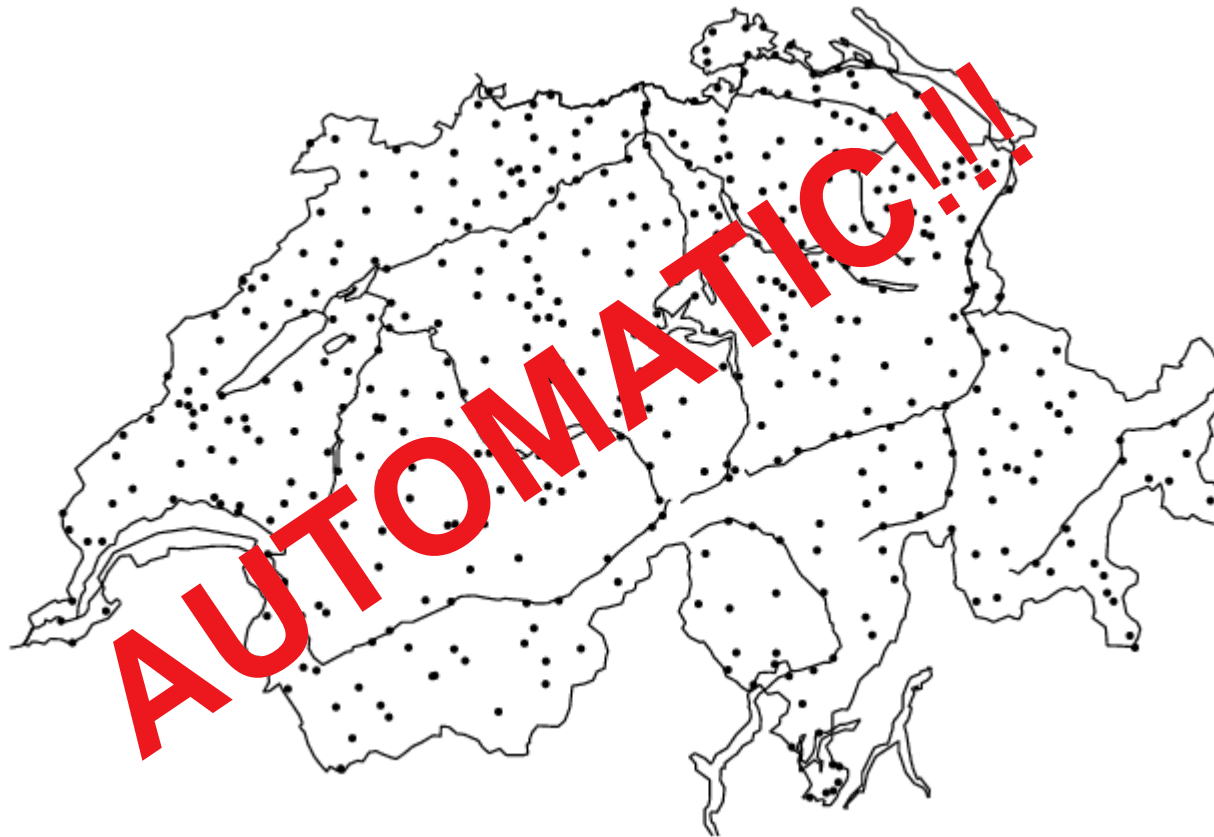**MeteoSwiss**

engineering

Task

Wind

10-minute gust max, max daily mean

Precipitation

AUTOMATIC!!!

Fresh snow

1-day, 2-day, 3-day, 4-day, 5-day sums

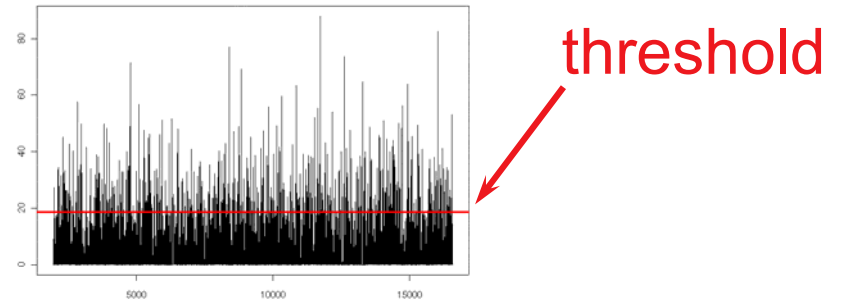max/min daily mean, max daily max, min daily min

Task

Block Maxima

max/year
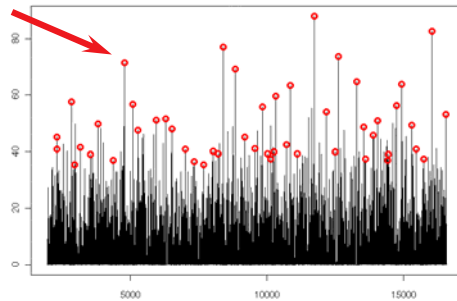
Gen. Extreme Value Distr. (GEV)
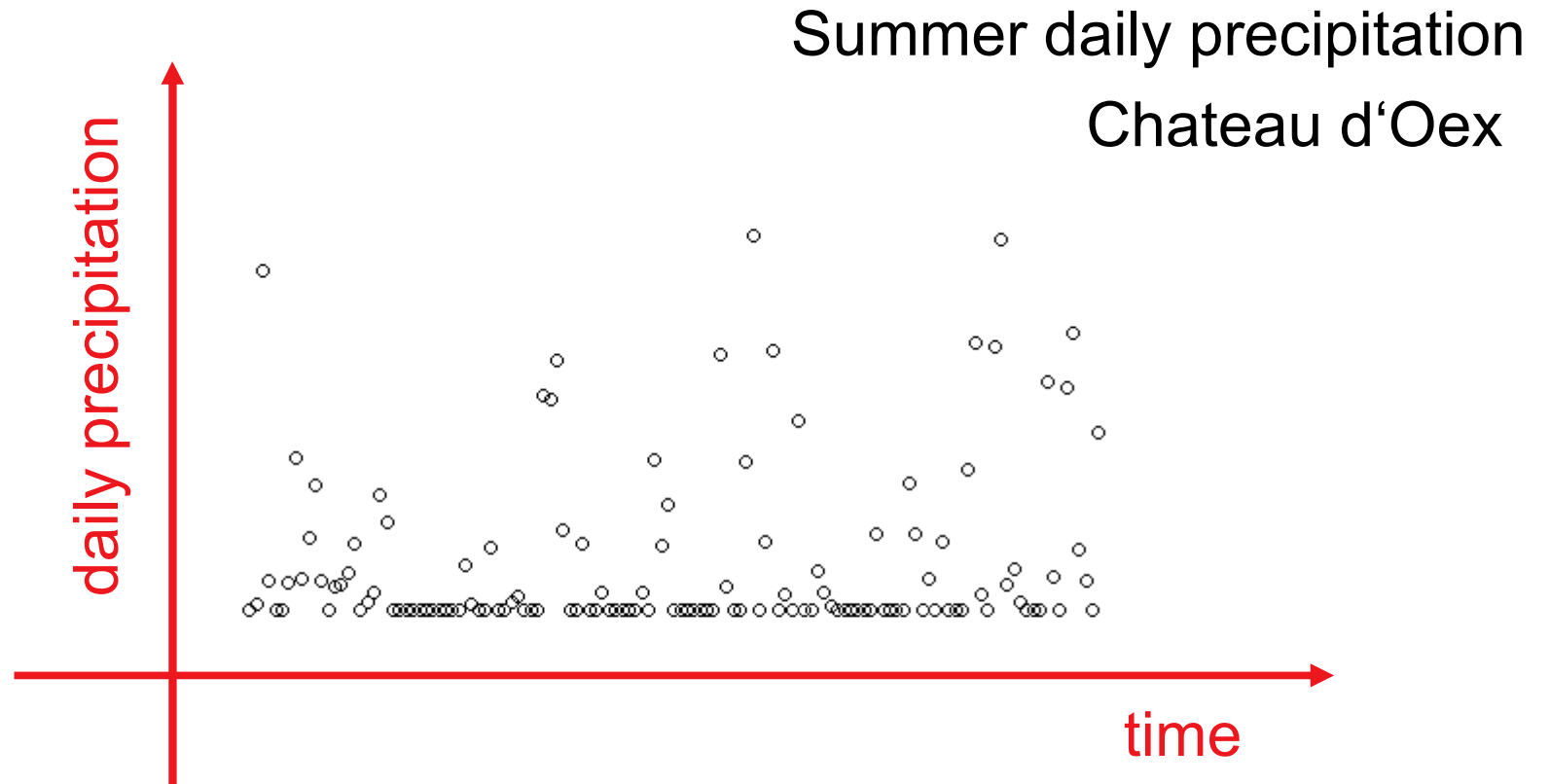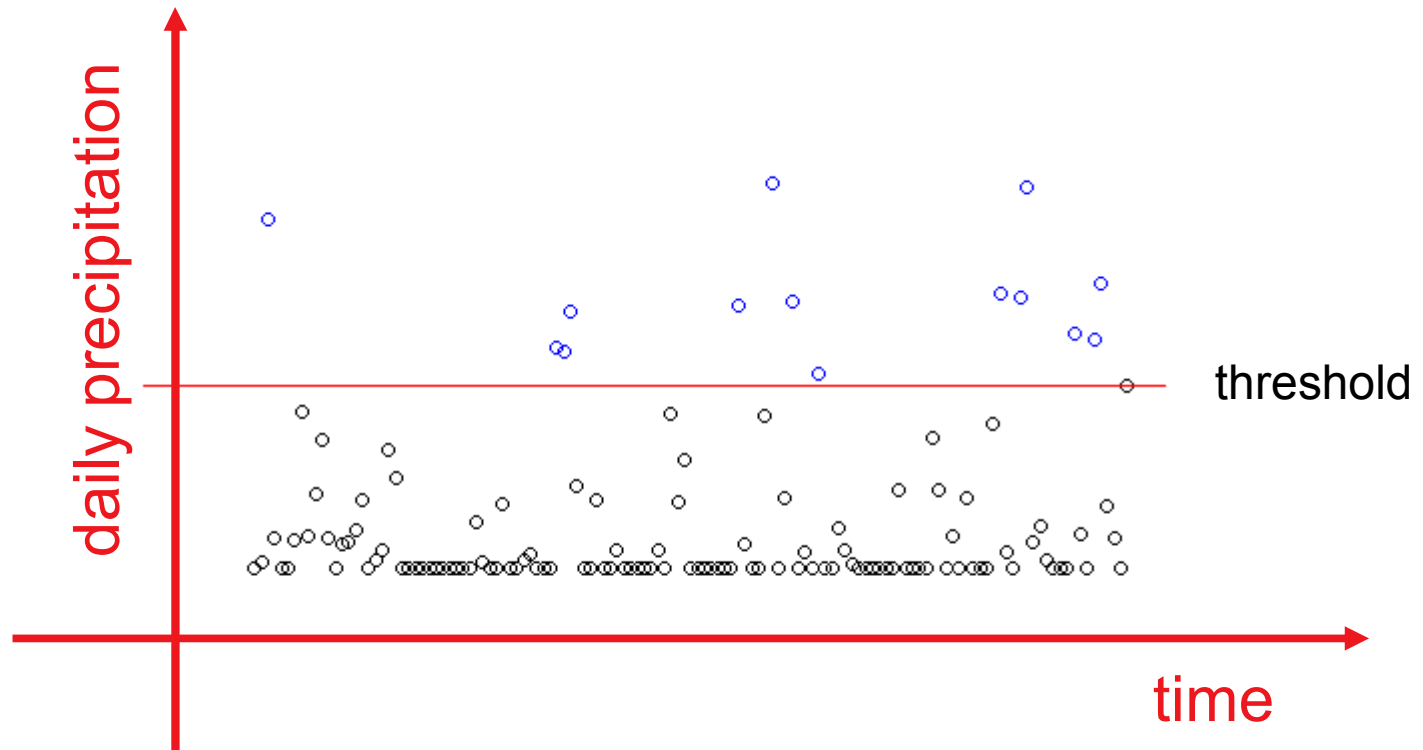
Peak-over-Threshold

threshold

Gen. Pareto Distr. (GPD)

automation

use Information Matrix Test
to select
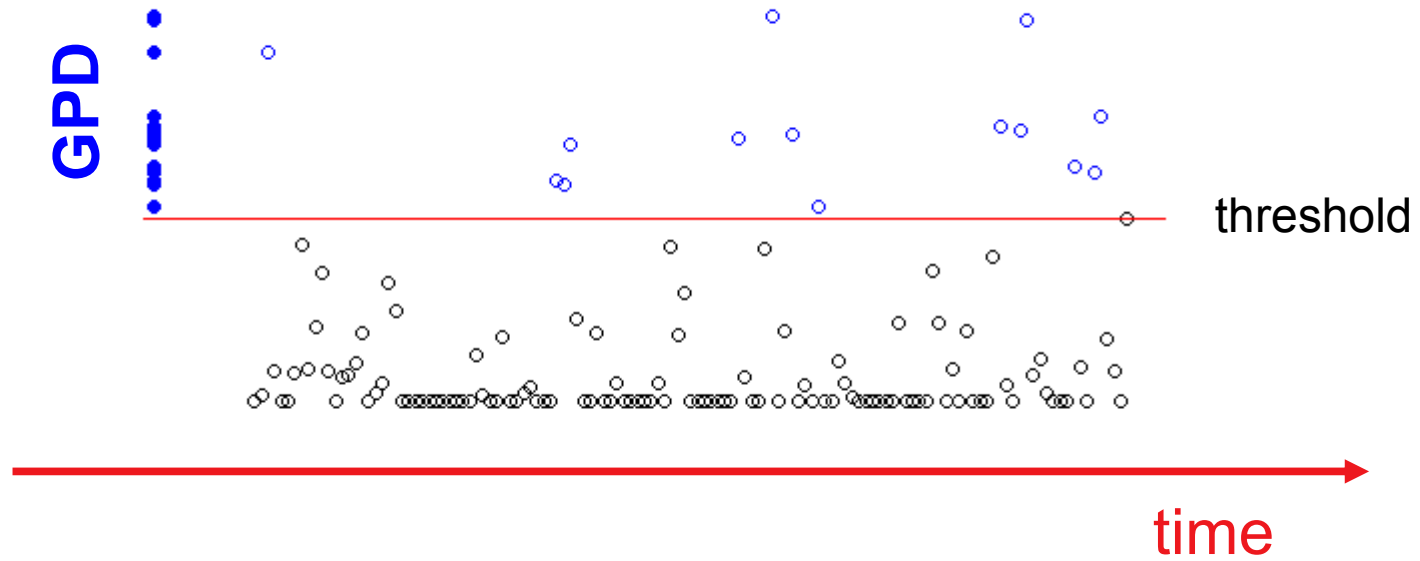• threshold
• run parameter

Information Matrix Test

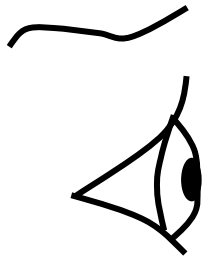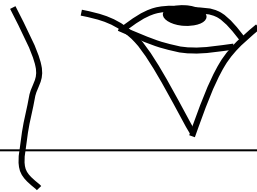Summer daily precipitation

Chateau d'Oex

IMT

threshold

daily precipitation
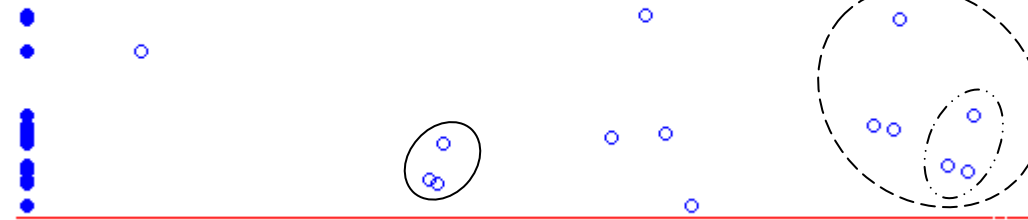
time

Information Matrix Test

Information Matrix Test

GPD
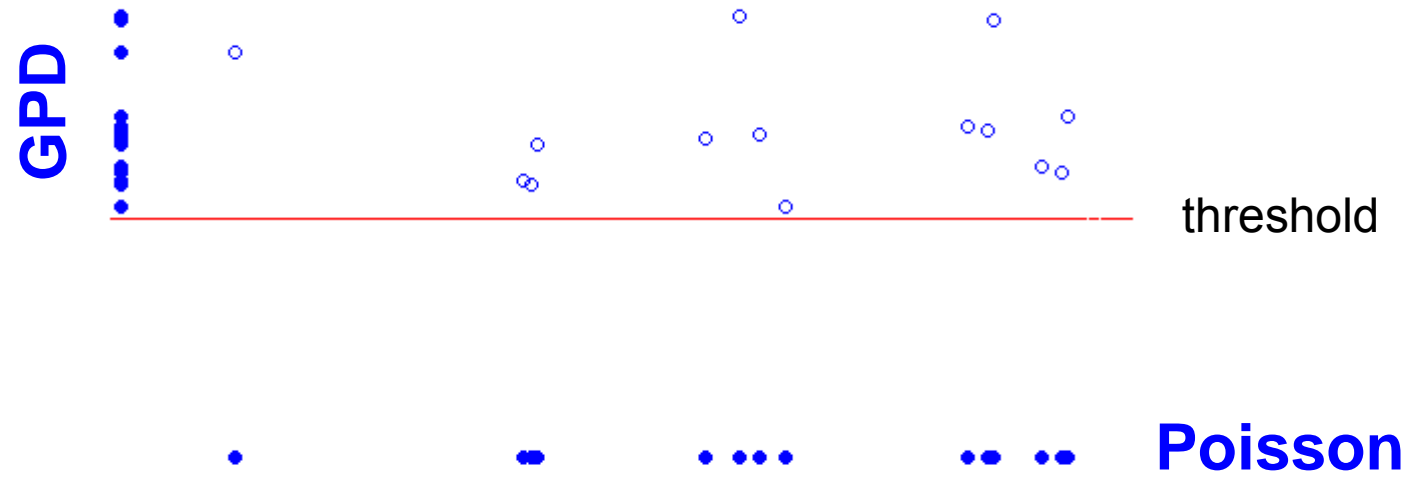
threshold

Poisson

Information Matrix Test

run parameter:
min. distance between
independent events

GPD

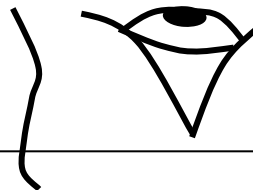threshold

Poisson

Exponential

select
- threshold
- run parameter
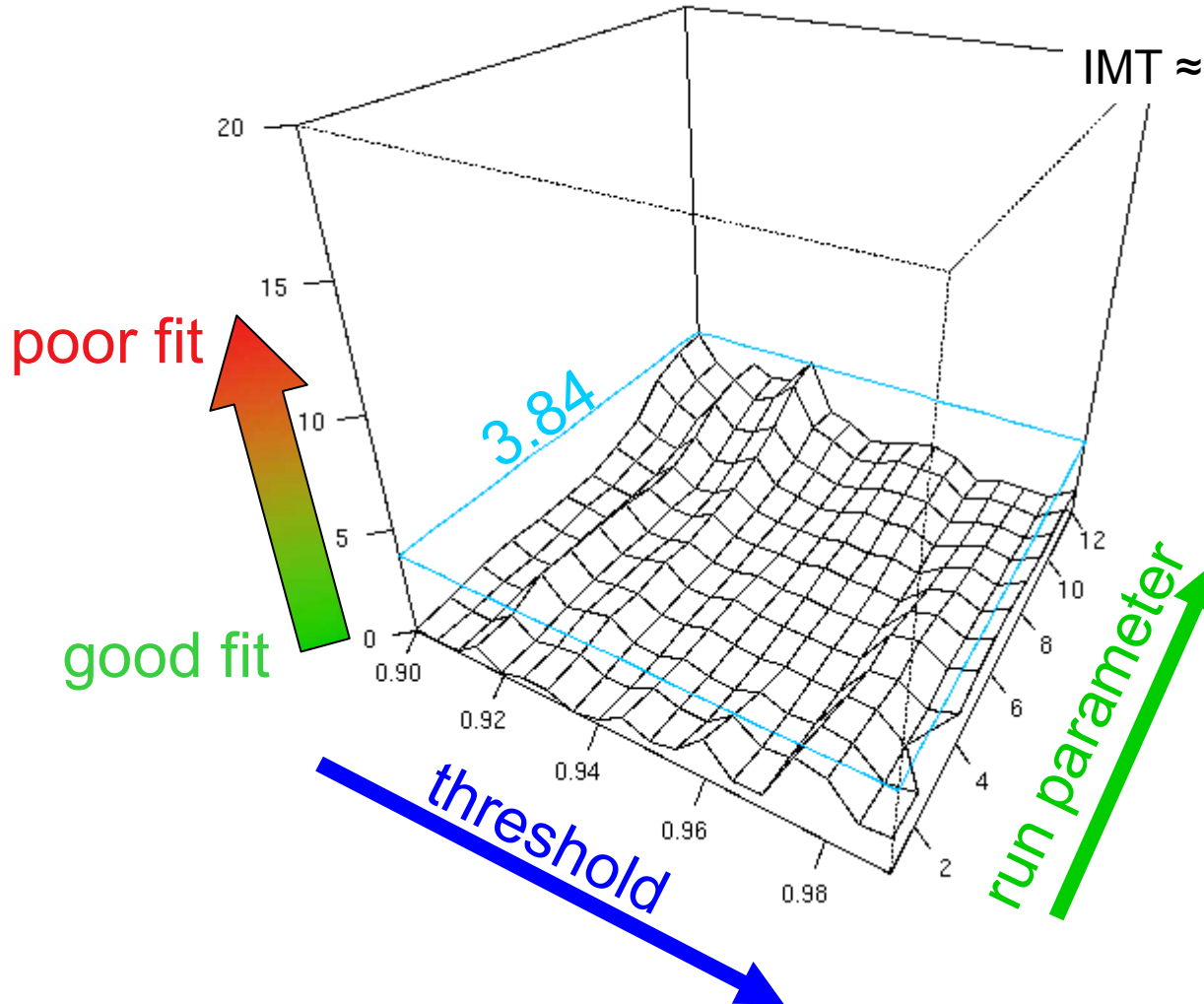with best model
of inter-cluster times

Information Matrix Test

IMT > 3.84: poor fit

Süveges & Davison, 2010
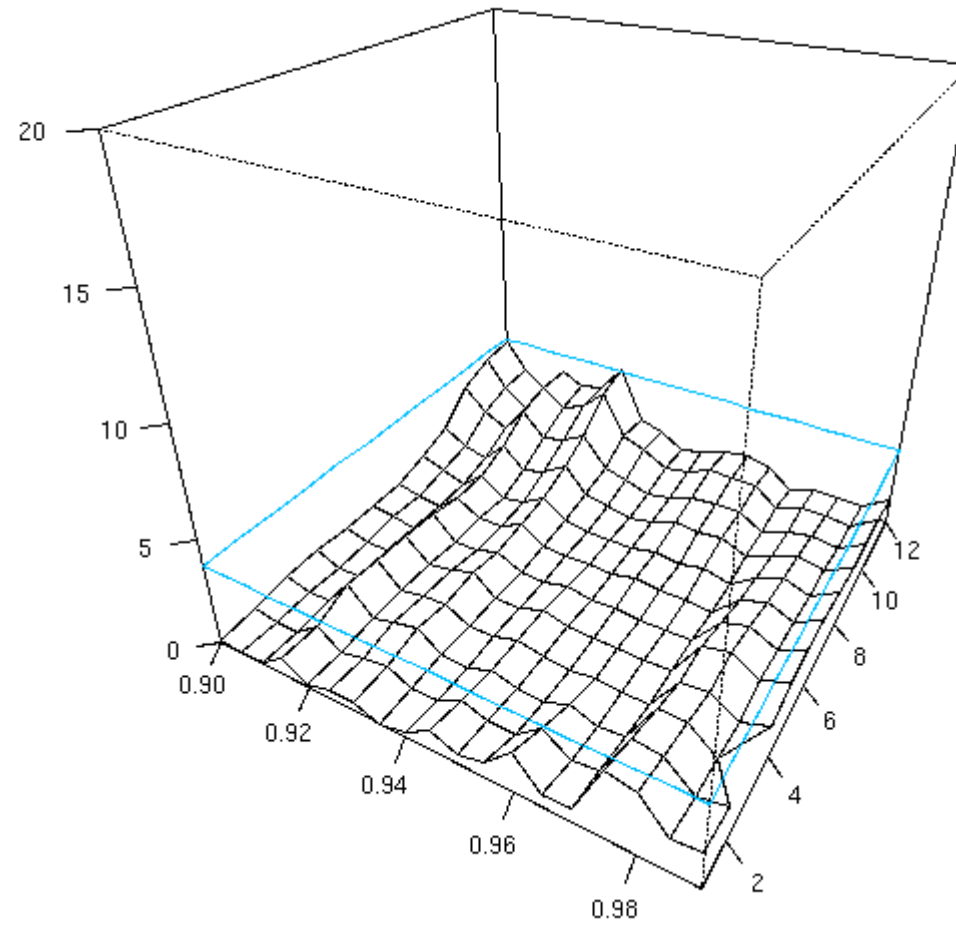
IMT < 3.84: acceptable fit

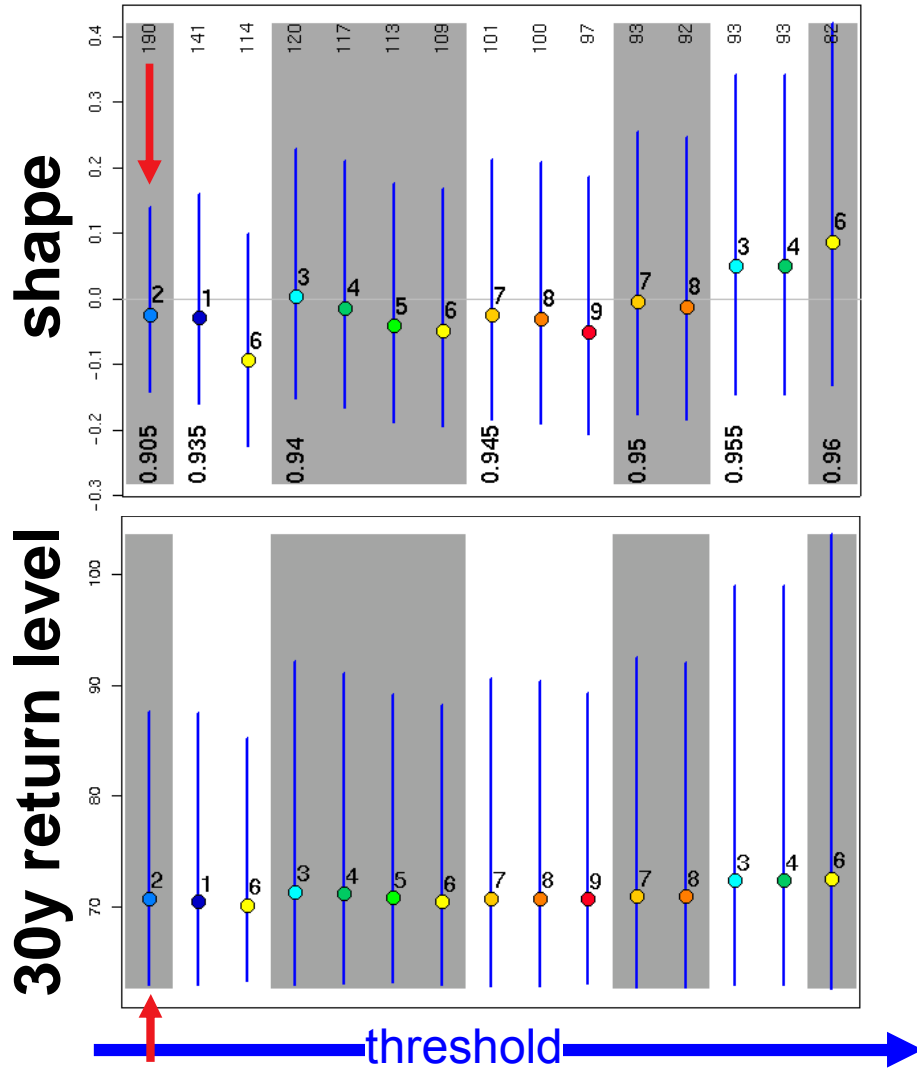IMT ≈ 0: best fit

Algorithm

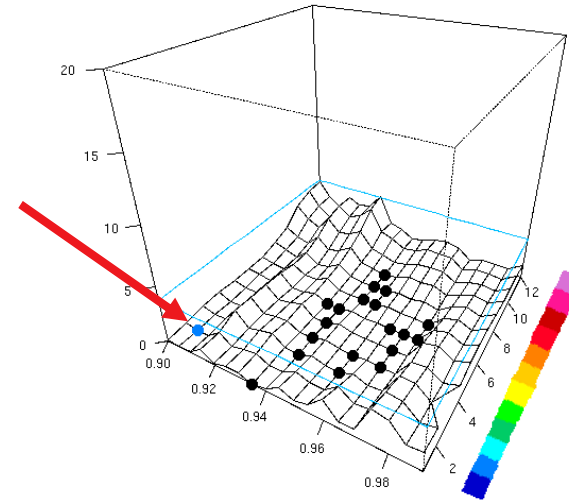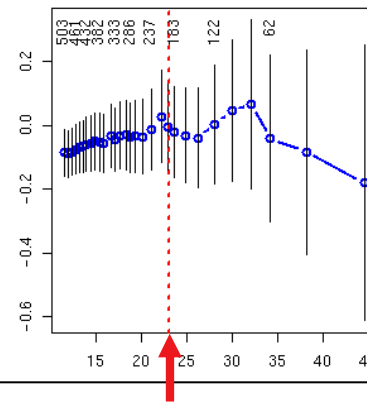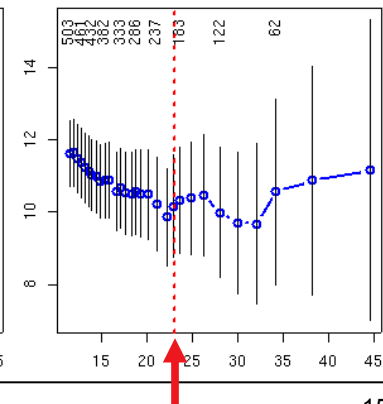# **Algorithm**

IMT < 0.05

Algorithm

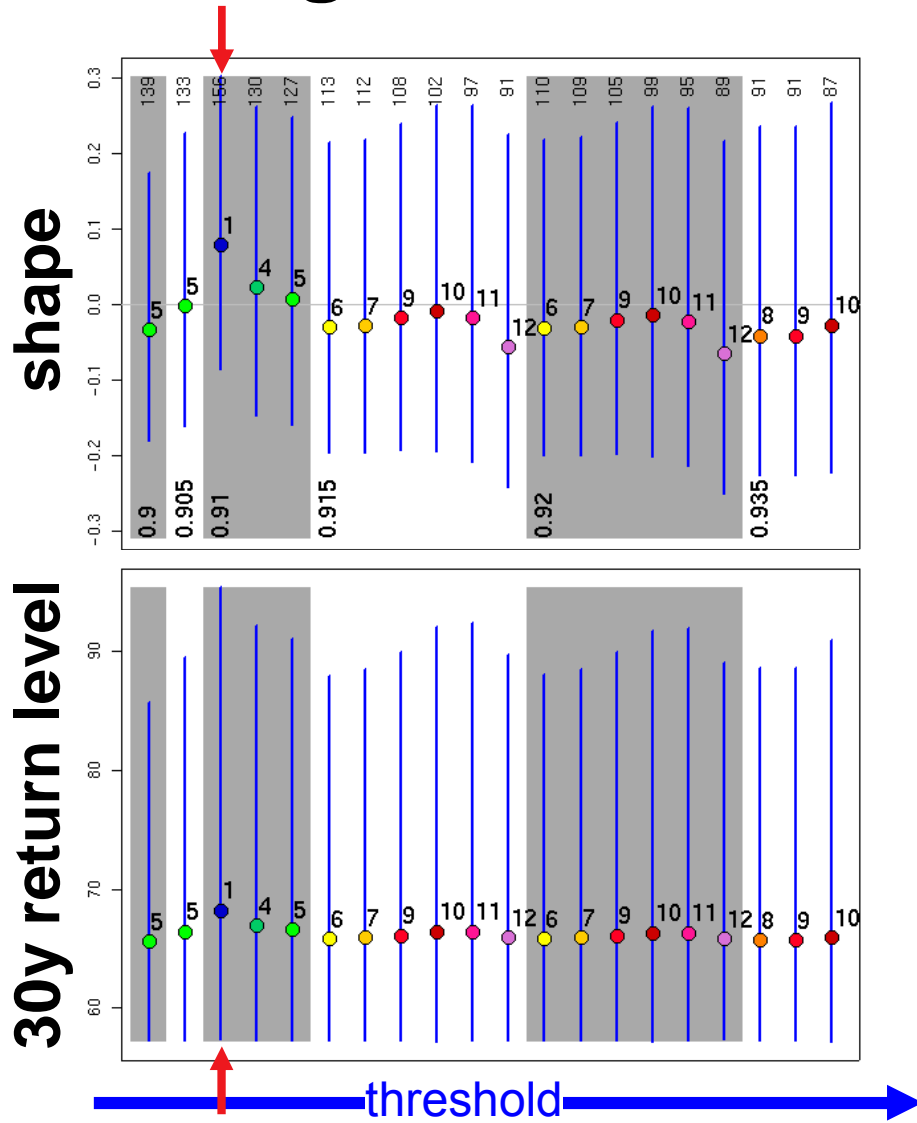IMT < 0.05
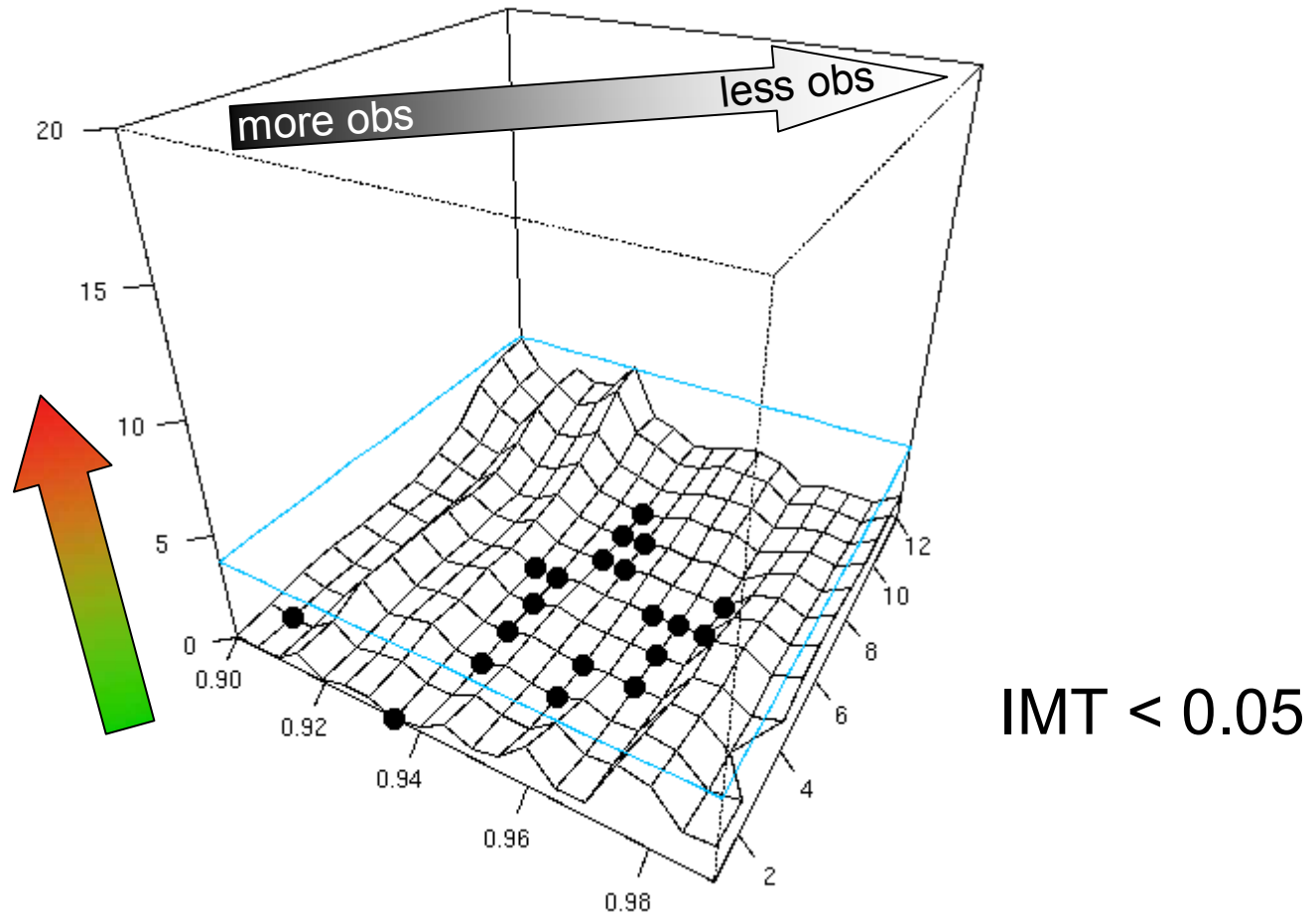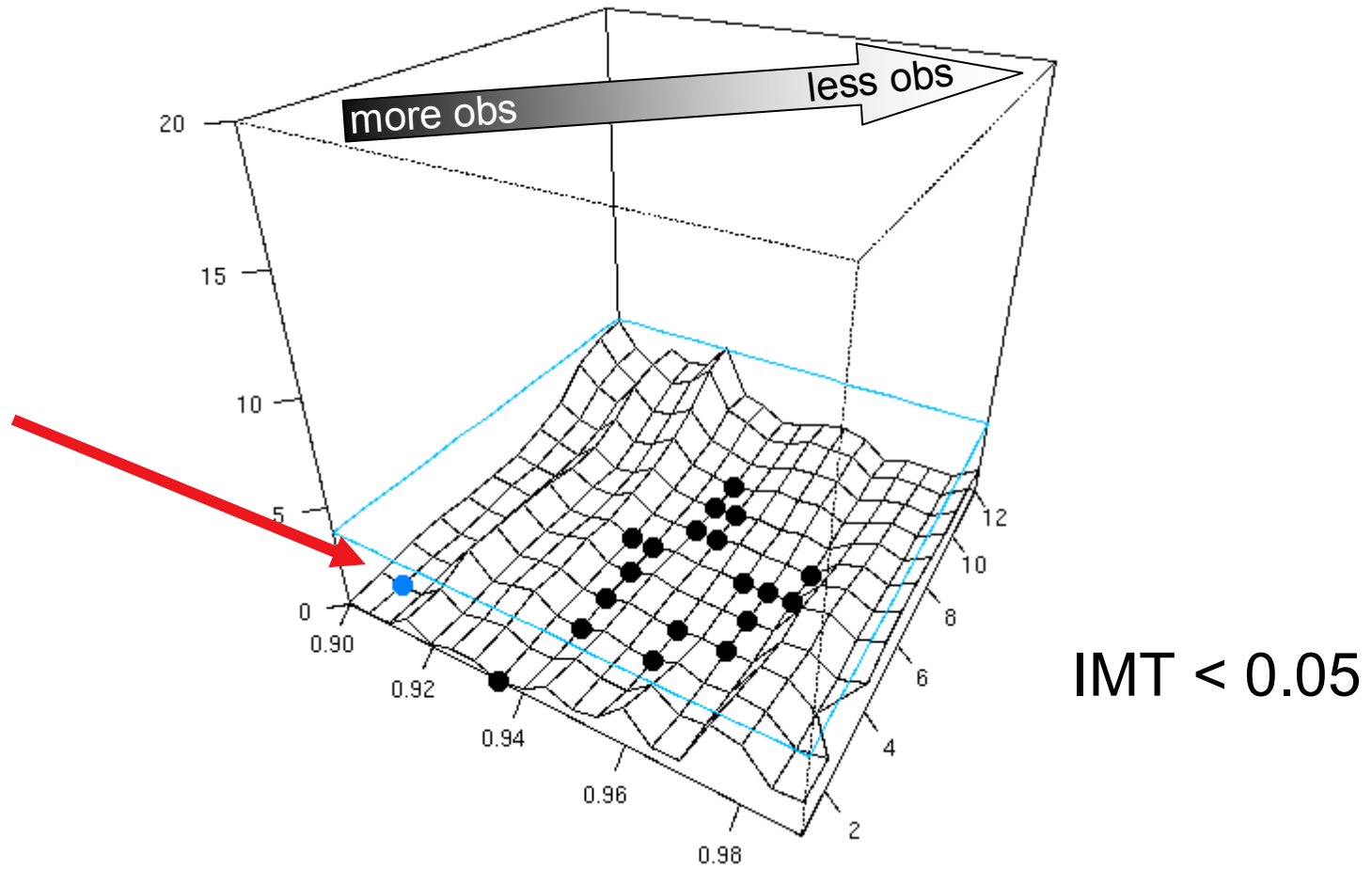
Algorithm

Summer daily precipitation
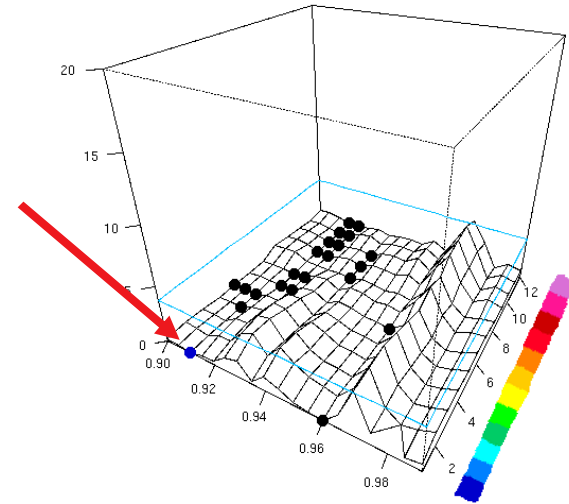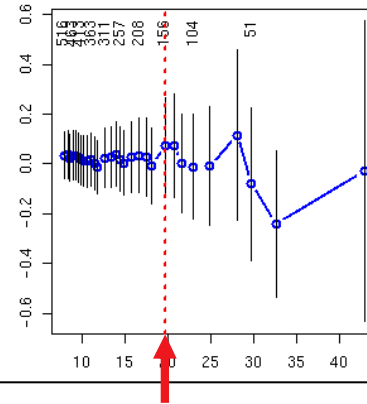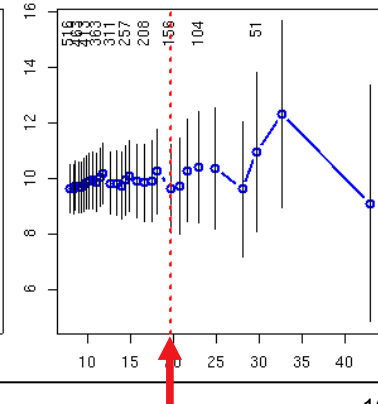Chateau d'Oex

shape

mean exceedance

Sophie Fukutome
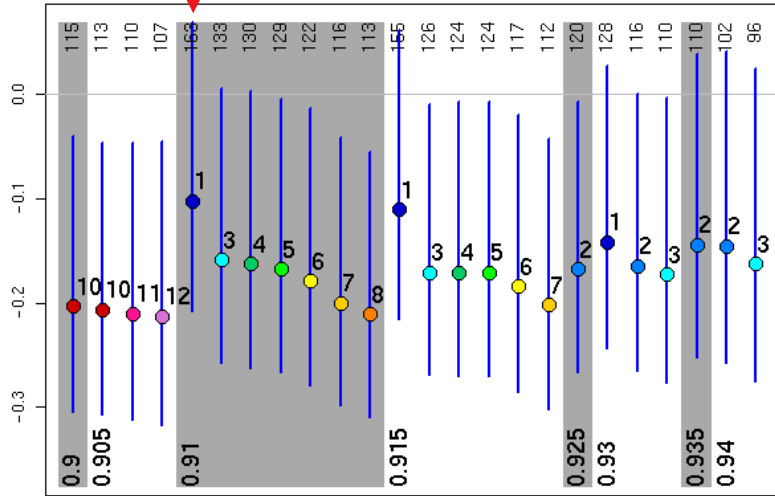
ESF-COST 2010

15

Algorithm

Summer daily precipitation Geneva

shape

30y return level

threshold

shape

mean exceedance

Sophie Fukutome

ESF-COST 2010

16

Algorithm
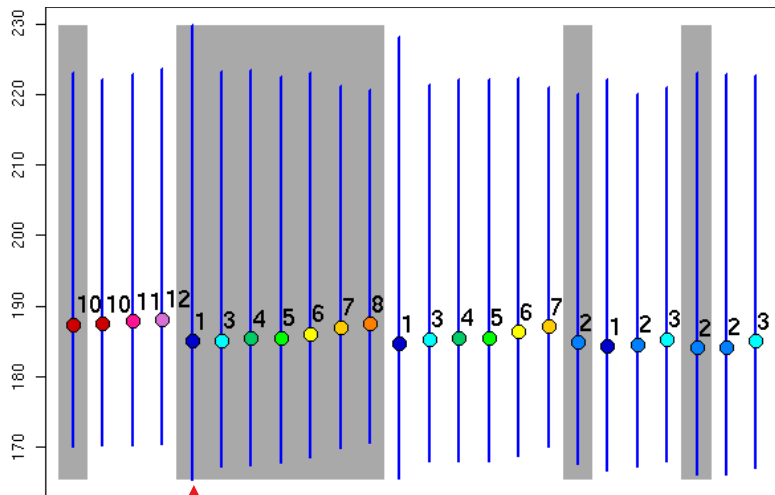
Summer daily precipitation
Locarno

shape

30y return level

threshold
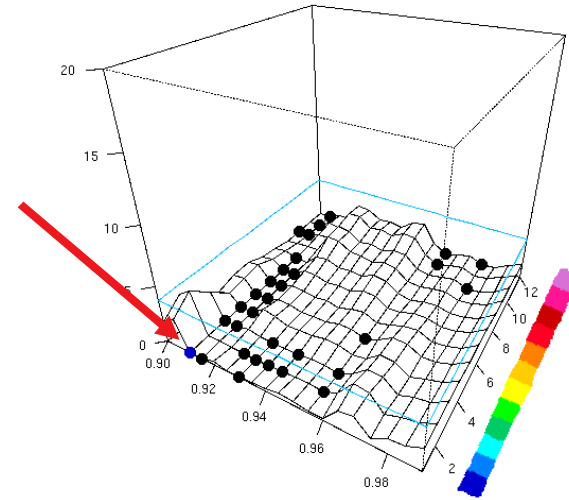
shape
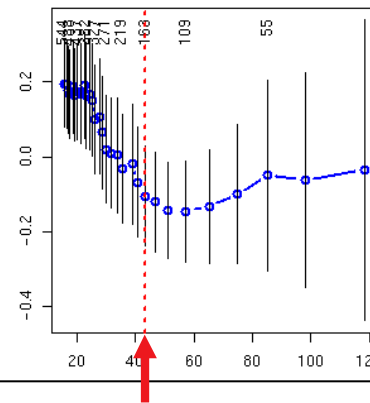
mean exceedance
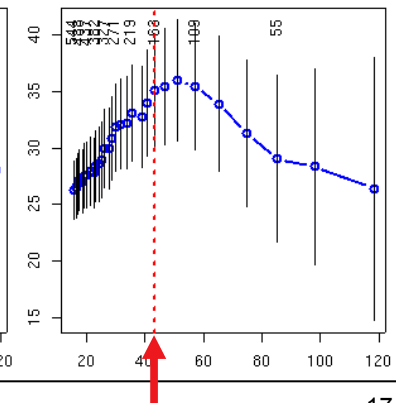
Applications: hourly precipitation

Engelberg: Summer

Engelberg (1036m)

8.4°E, 46.8°N

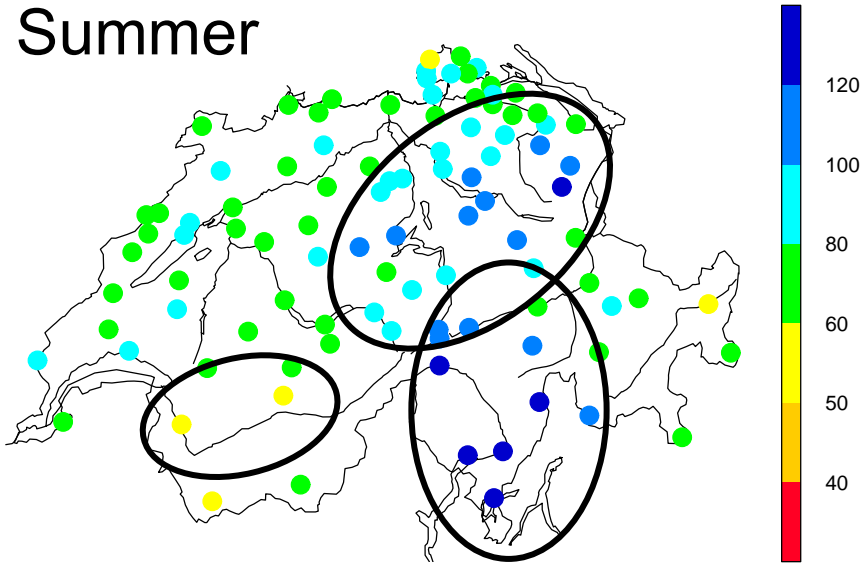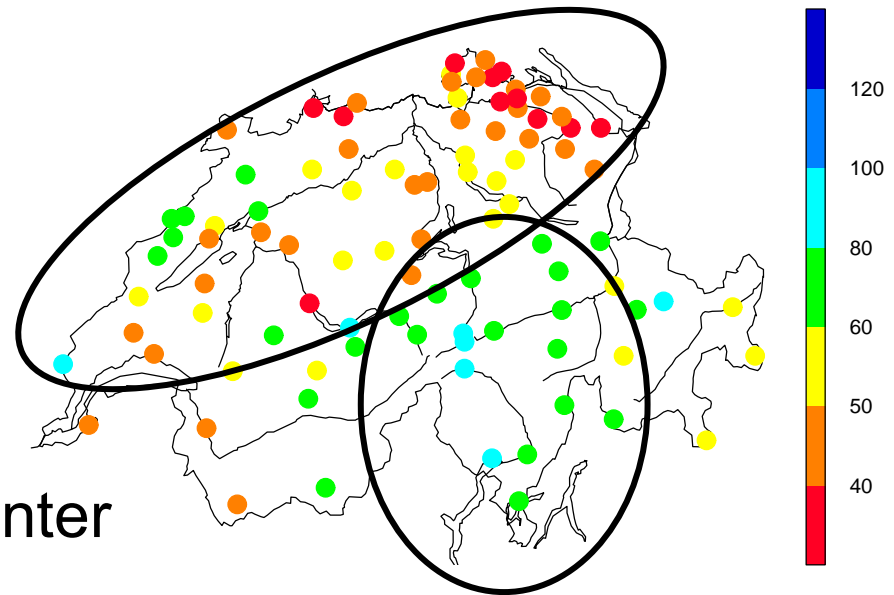1983 – 2009

© MeteoSchweiz
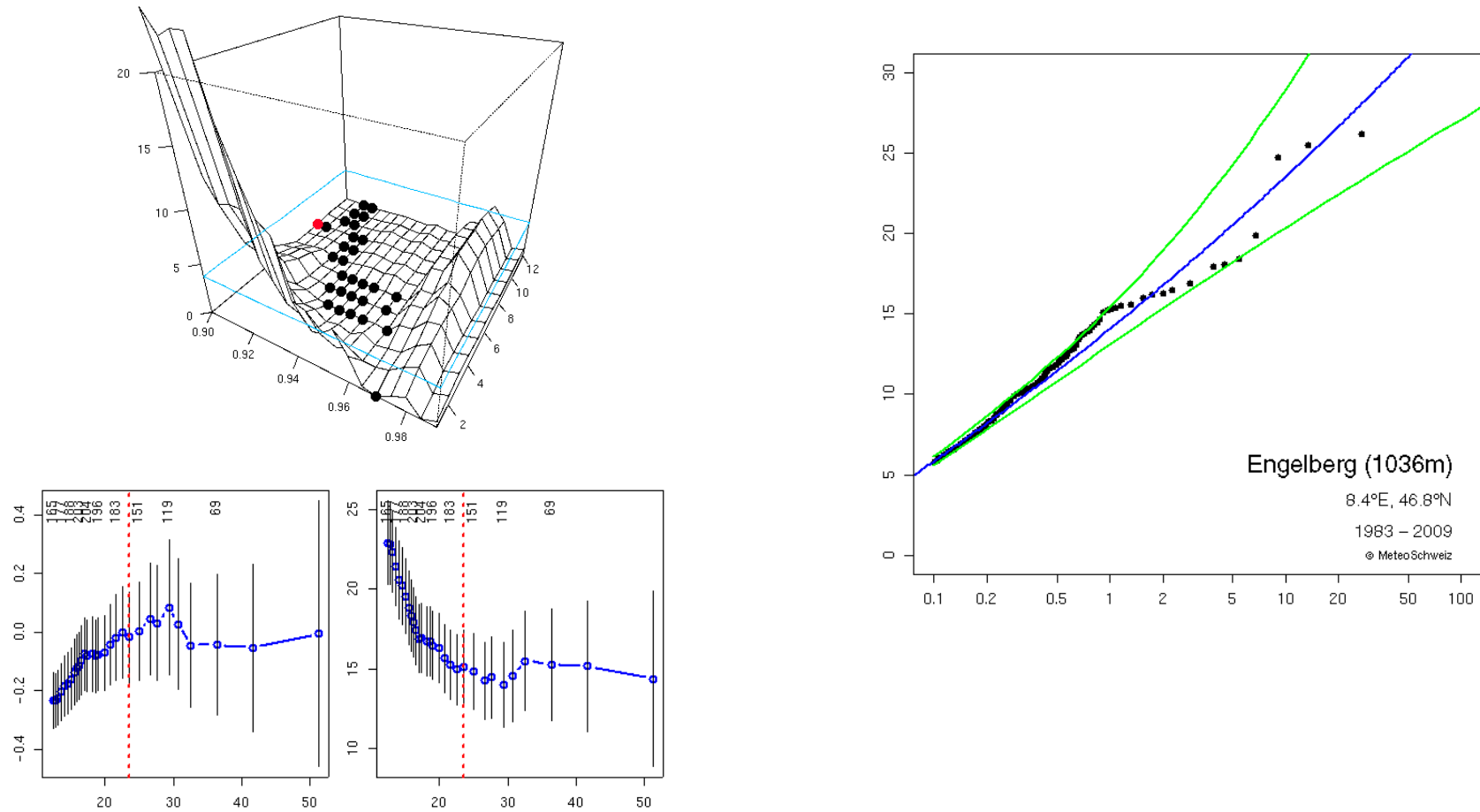
Applications: daily precipitation
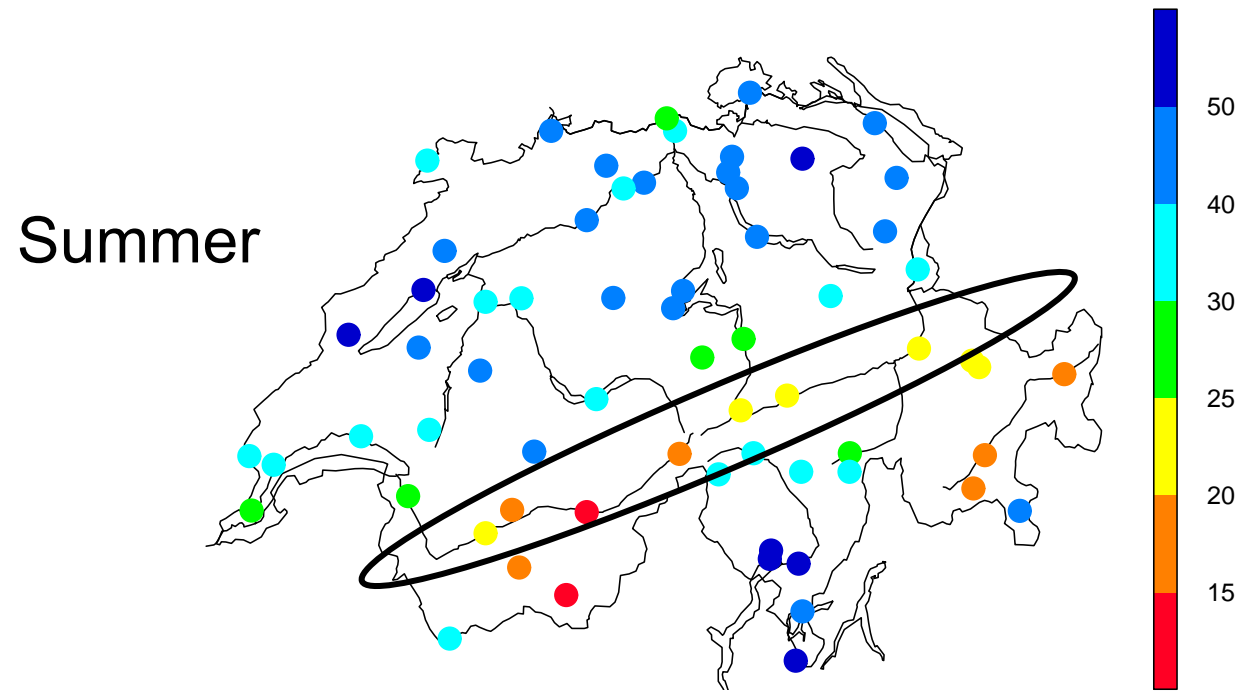
30-year return levels

Applications: hourly precipitation

30-year return levels

Summer

Conclusions

Summary

- The Information Matrix Test can be used to select threshold and run parameter automatically

  - selected thresholds gen. compatible with classical diagnostics

  - results agree with climatology

- More objective selection based on theoretical criteria

Outlook

- Other aggregations, other parameters

- Improve algorithm

Thank you!...