A PAGES Floods WG pilot project.
Integration of multidisciplinary datasets

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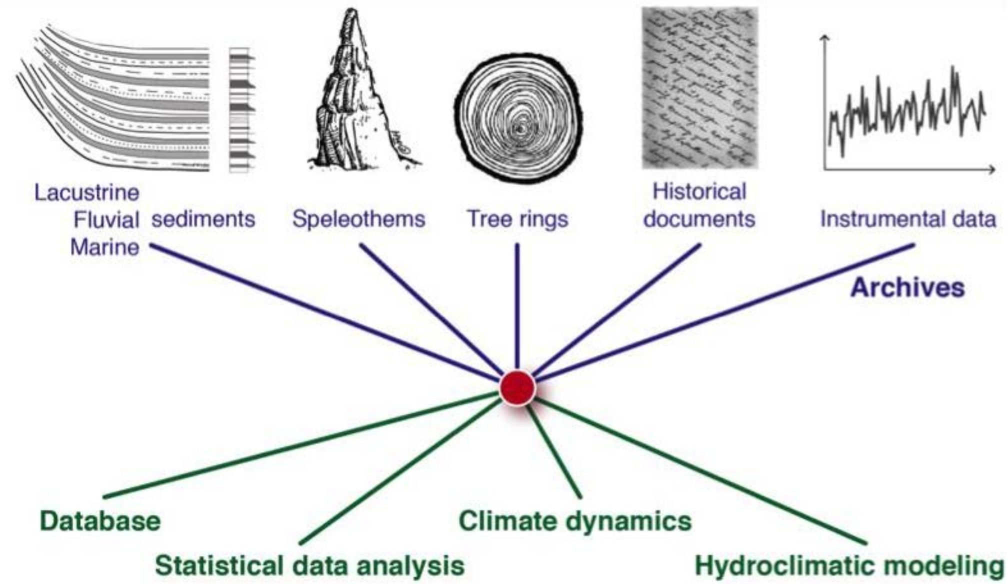
FLOODS goals

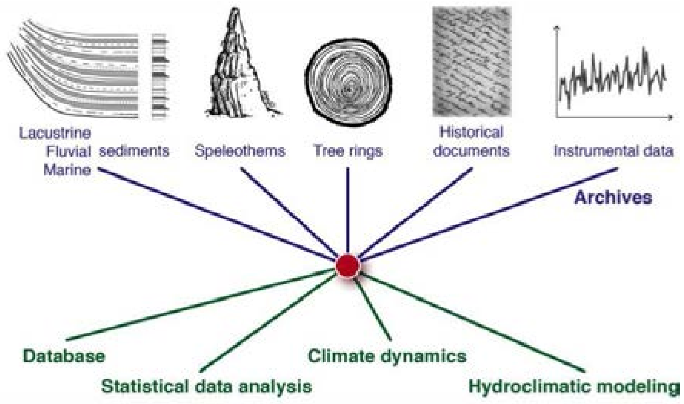
1. Analysis of real-world data on past floods on long historical/millennial time scales that includes the most extreme flooding episodes.
2. Bringing together researchers from different communities investigating past flood events worldwide is timely in order to coordinate and synthesize results on the natural variability of floods.
3. Ideal platform to promote collaboration among the different research communities and foster scientific progress.

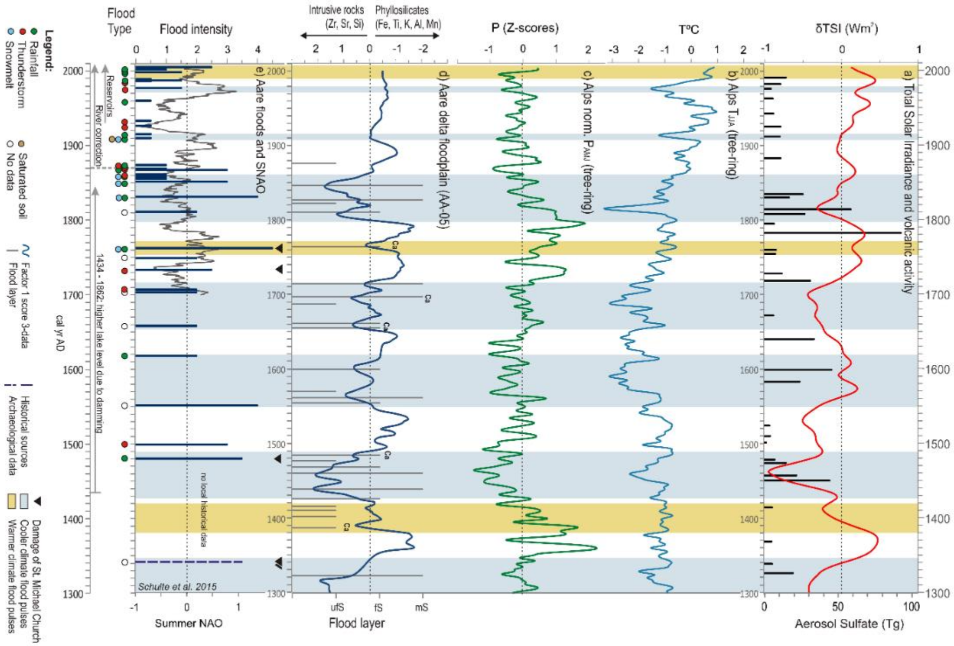


Data base project
(Michael Kahle & Pierre Francus)

Profiles of Floods Working Group members
(Marieke Ahlborn)

Pilot project: integration of multidisciplinary datasets
(this presentation)





Schulte et al., 2015. HESS 19, 3047-3072

Problem definition: How to integrate multiproxy datasets?

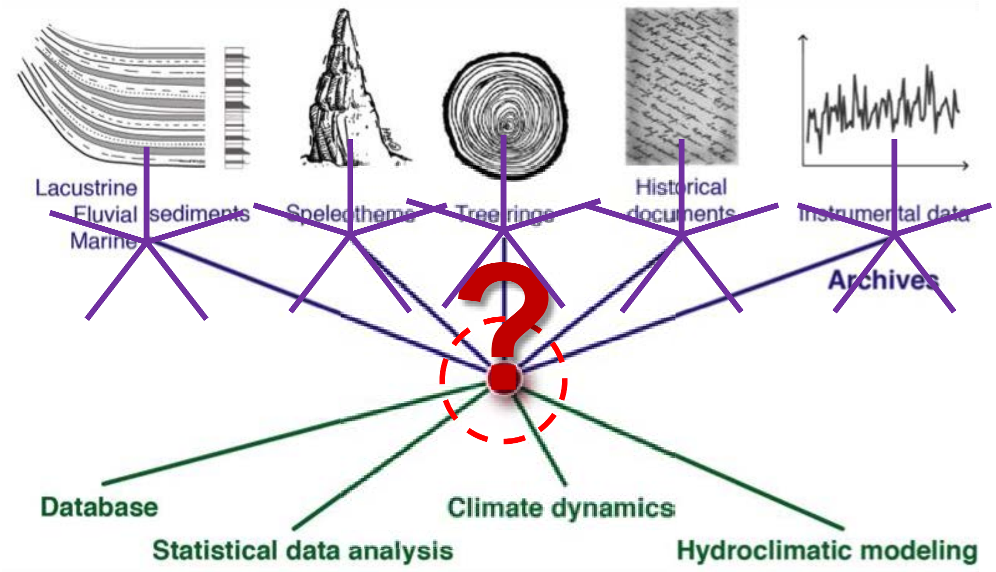
Most of our research projects integrate already different type of flood proxies on local scales.

a) Independent variables (multiproxy) to generate a robust flood series

b) Calibration of magnitude and time of flood episodes

c) Complementary information for a better spatial comprehension of processes

But it is really easy…..?



Pilot project: integration of multidisciplinary paleoflood datasets
(this presentation)

The problem starts with the discussions within FWG Database Sub-groups:

Historical archives, tree rings, fluvial sediments, lake/fjord sediments, speleothems

Catchments size and geographical location?

Length of series and resolution?

Flood periods or single episodes?

Problem definition: How to integrate multiproxy datasets?

Same questions + …

Which proxies are robust flood signals?

Which series are comparable? - Because of different sensitivity of proxies according to the regional settings, environment and processes.

At which time scale multiproxy paleo-flood integration makes sense?

(1) Different communities – different views

Floodplain and rivers:

*Lothar Schulte**

Filipe Carvalho

Historical data:

Oliver Wetter

Lake records:

Bruno Wilhelm

*Benjamin Amann**

*Stefanie Wirth**

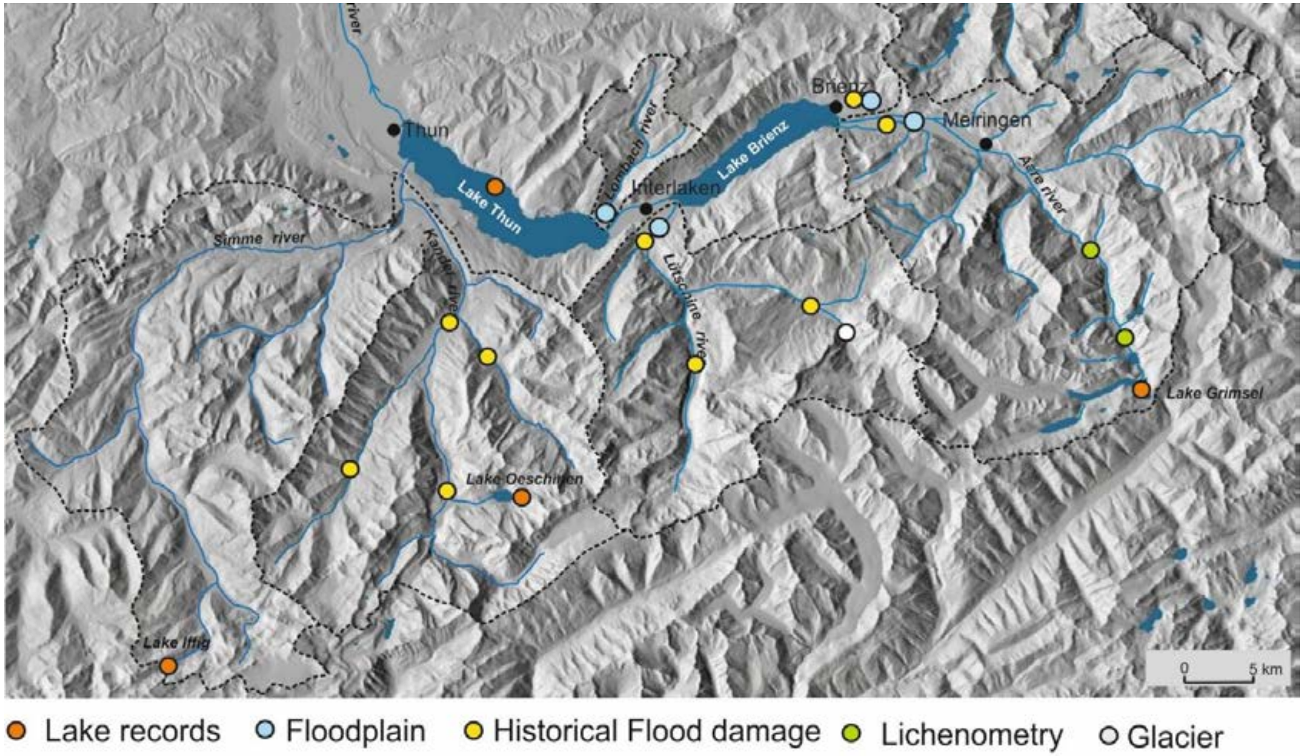
*Lukas Glur**

Paleoclimate modeling:

*Juan Carlos Peña**

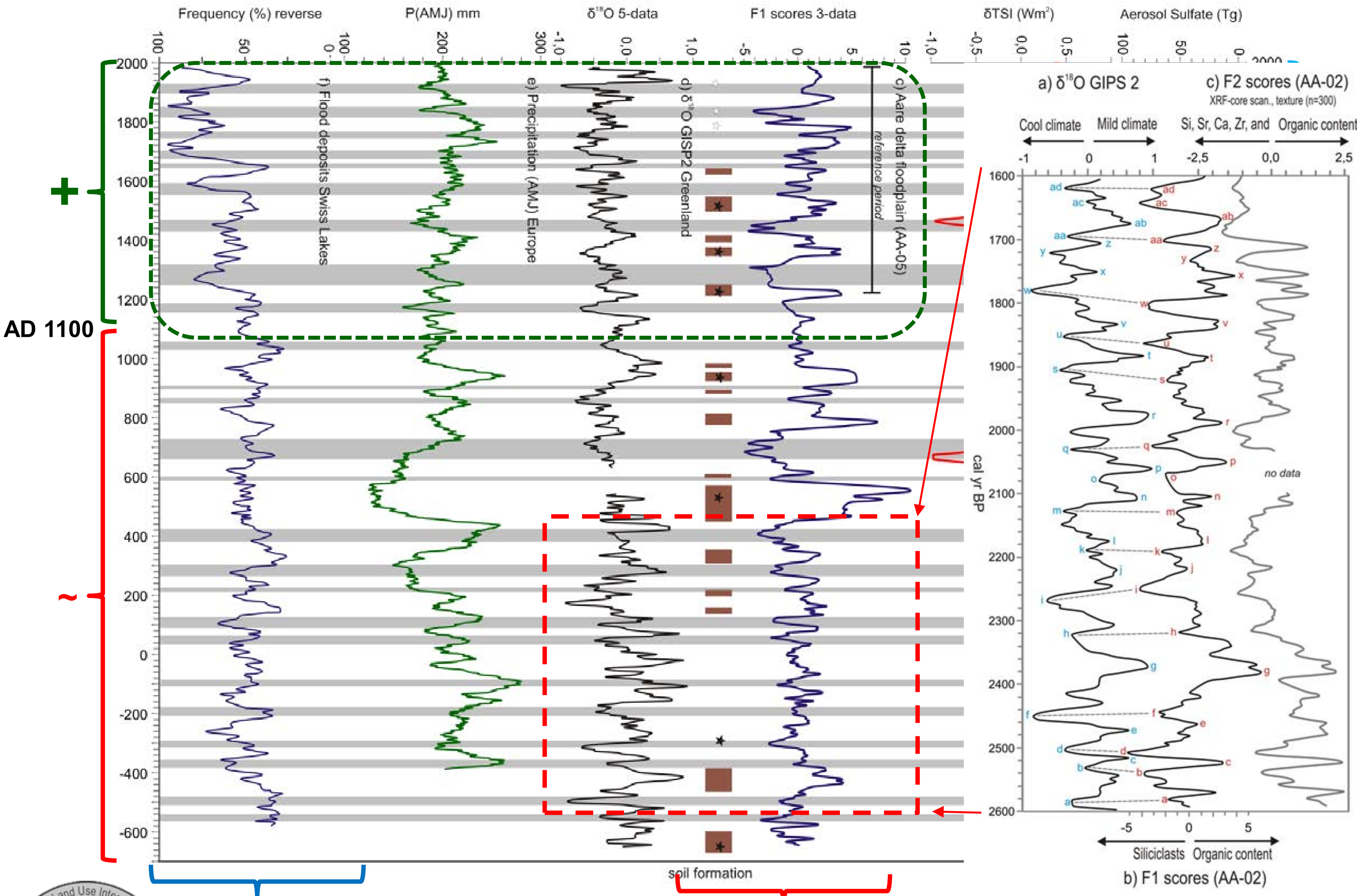
** data provided by*

(2) Different physiographic and regional settings and type of archives



Catchment	Type of data	Catchment area km2	Elevation of flood record m.a.s.l.	Highest elevation m.a.s.l.
Lake Thun	lake, historical	2451	558	4273
Hasli-Aare	fluvial, historical, instr., lichen	596	568	4273
Kander	historical, instr.	496	600	3698
Lütschine	fluvial, historical, instr.	379	569	4158
Lombach	fluvial	48	569	2085
Lake Oeschinen	lake	21	1580	3661
Lake Grimsel	lake	5	1908	2941
Lake Iffigsee	lake	4,6	2065	3246
Eistlenbach	fluvial	4	644	2204

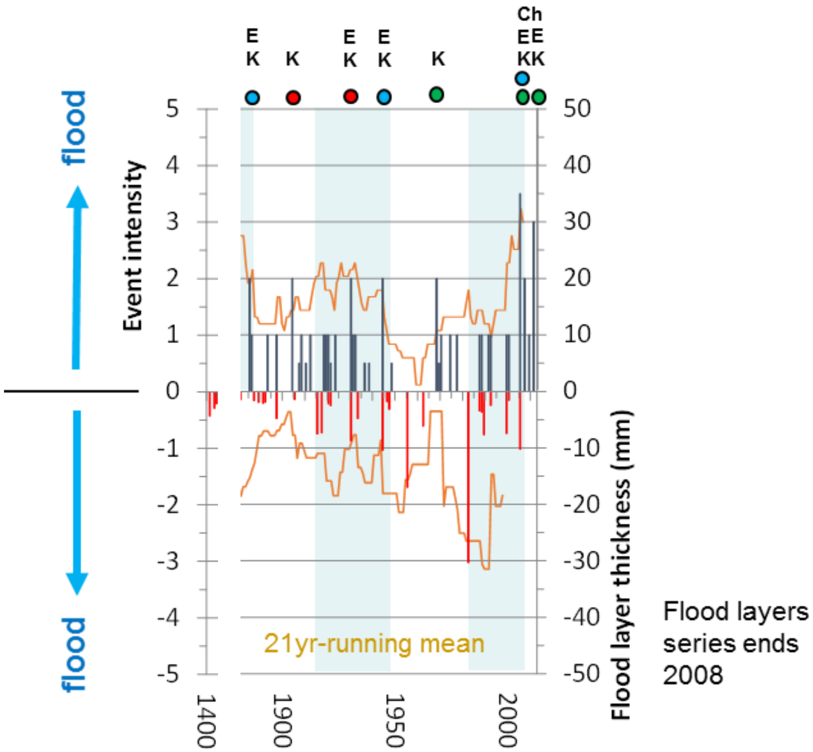
(3) Increase of uncertainty with age.



Swiss lakes N
Glur et al., 2013

Hasli-Aare floods
Schulte et al., 2015

Historical Kander river floods
Schulte et al., 2017. OSM.



Lake Oeschinen flood layer thickness.
Amann et al., 2015. QSR 115.

(4) Different time precision and uncertainties. Running means (etc.) vs. exact dates.

Which data we enter in the data base?

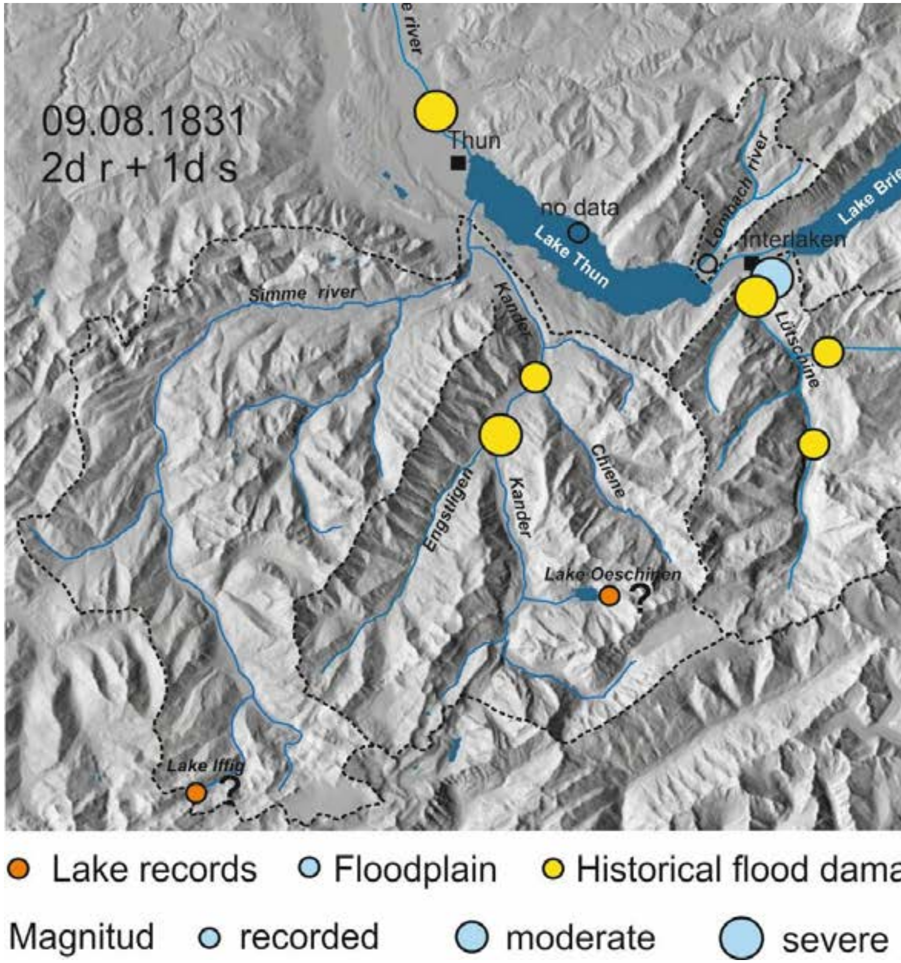
(5) Different involved hydrological and geomorphological processes according to the settings. → System sensitivity

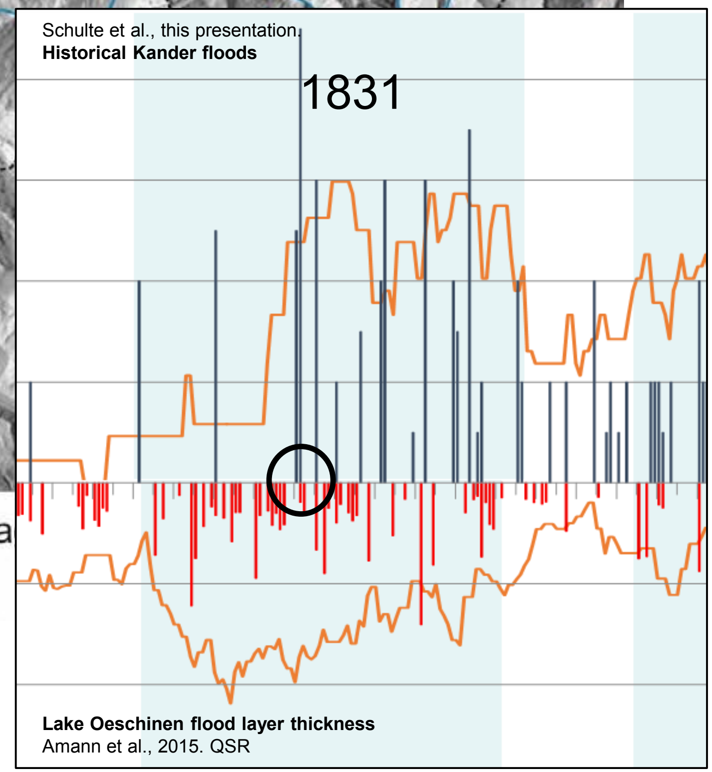
(6) How many "false alarms", how many floods we miss?

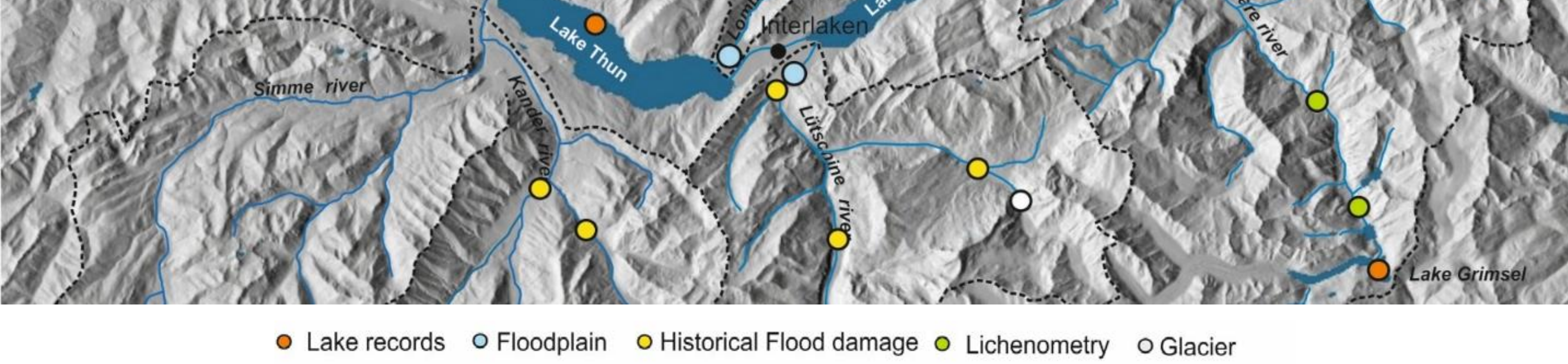
(7) Erosion processes in a small high elevation catchment must not coincide with floods in the main valley which affect settlements, infrastructure and people.

(8) The problem to attribute flood events to natural archive chronologies

09.08.1831, 2 days of rainfall + 1 day foehn > snowmelt







Some preliminary remarks:

1. Process of learning from colleagues of other scientific communities.
2. "No record is perfect" (uncertainties).
3. System sensitivity - erosion thresholds – catchment response to rainfall/flood events.
4. Focus on physical process of floods that caused damages to areas of human settlements (problem of exposure and vulnerability).
5. Time-spatial relation of study area (regional approach).
6. Problem of heterogeneous catchments and landscapes where hydrological, geological and environmental settings are different (thresholds).

BUT REMEMBER, we are studying **"real nature"**; we are not doing experiments in a laboratory where settings can be defined. The selection of catchment settings is limited.