

Christian Rohr: The severe flood of 1868 in southeast Switzerland and in northern Italy

The severe flood of 1868 in southeast Switzerland and in northern Italy – a turning point in water management and prevention policies?

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Acqua Roma – Nourisher of
Life and Bearer of Meaning

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Outline

- General considerations
 - Historical hydrology
 - Disaster perception
- The flood of 1868
 - An interdisciplinary research project at the Oeschger Centre
 - Historical sources
 - Reconstruction
 - Disaster management
 - Political consequences
 - Further research
- Conclusions

Historical hydrology

- Main issues of natural and engineering sciences
 - Reconstruction of extreme historical events (peak discharge, affected areas)
 - Generation of data to calculate the recurrence probability of extreme floods
 - Definition of endangered areas towards floods
- Social and cultural studies
 - Study of regional and supra-regional adaptation strategies
 - Settlement places
 - Building techniques, flood protection in general
 - Memory cultures
 - Examination of the economic and social impact on society
 - Analysis of historical coping and adaptation strategies (including inappropriate behaviour) to support present-day and future decisions


From natural hazards to (natural) disasters

- Cultural history approach asks for the perception, interpretation, (risk) management and memory of natural hazards
- Parameters to perceive a natural hazard as disaster (Rohr 2007)
 - The helplessness of the people trying to cope with the damage with the available means
 - The inability of individuals to explain and understand the event
 - The material and personal suffering
 - The unexpectedness of the event, which depends on how prepared a society is for one-time or recurrent threats
 - Whether there is a series of natural hazards within a short period of time, which can raise the vulnerability of the afflicted people
 - The symbolic connotations and patterns of interpretation, such as connections to natural disasters described in the Bible
 - The general predicament, such as a simultaneous economic, religious and climatic crisis (e.g. during the sixteenth century in Europe)

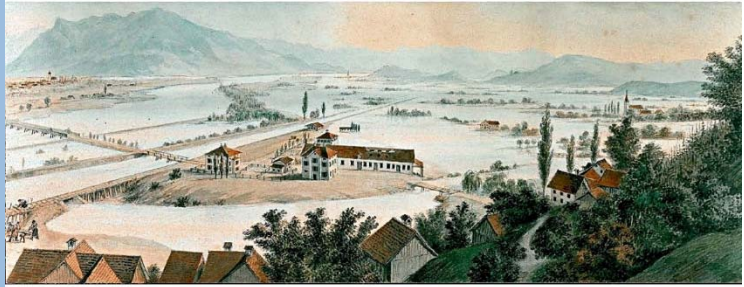
The flood of 1868

Interdisciplinary research project at the Oeschger Centre

- 150 years anniversary in 2018
- Contributing disciplines
 - Climatology
 - Hydrology
 - Forestry Studies
 - Geology
 - Environmental and Climate History
 - Political Science
- Publication addressed to a wider public (Geographica Bernensia)
 - Available online and in print
 - German, English, French and Italian version



1868 – the flood that changed Switzerland:
Causes, consequences and lessons for the future



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The flood of 1868

Historical sources

- Written sources
 - Local and supra-regional newspapers
 - *Gazzetta Ticinese*
 - *Gazzetta Piemontese* (predecessor of La Stampa)
 - *Bozner Zeitung*
 - Contemporary scientific treatises (e.g. Coaz 1869, Arpagaus 1870)
- Instrumental measurements and other weather observations
 - Swiss national meteorological network (today MeteoSwiss) established in 1863
 - Basic data for climatological and hydrological modelling today
- Pictorial and epigraphical evidence
 - Drawings, early photographs
 - Maps of the inundated areas
 - Flood marks

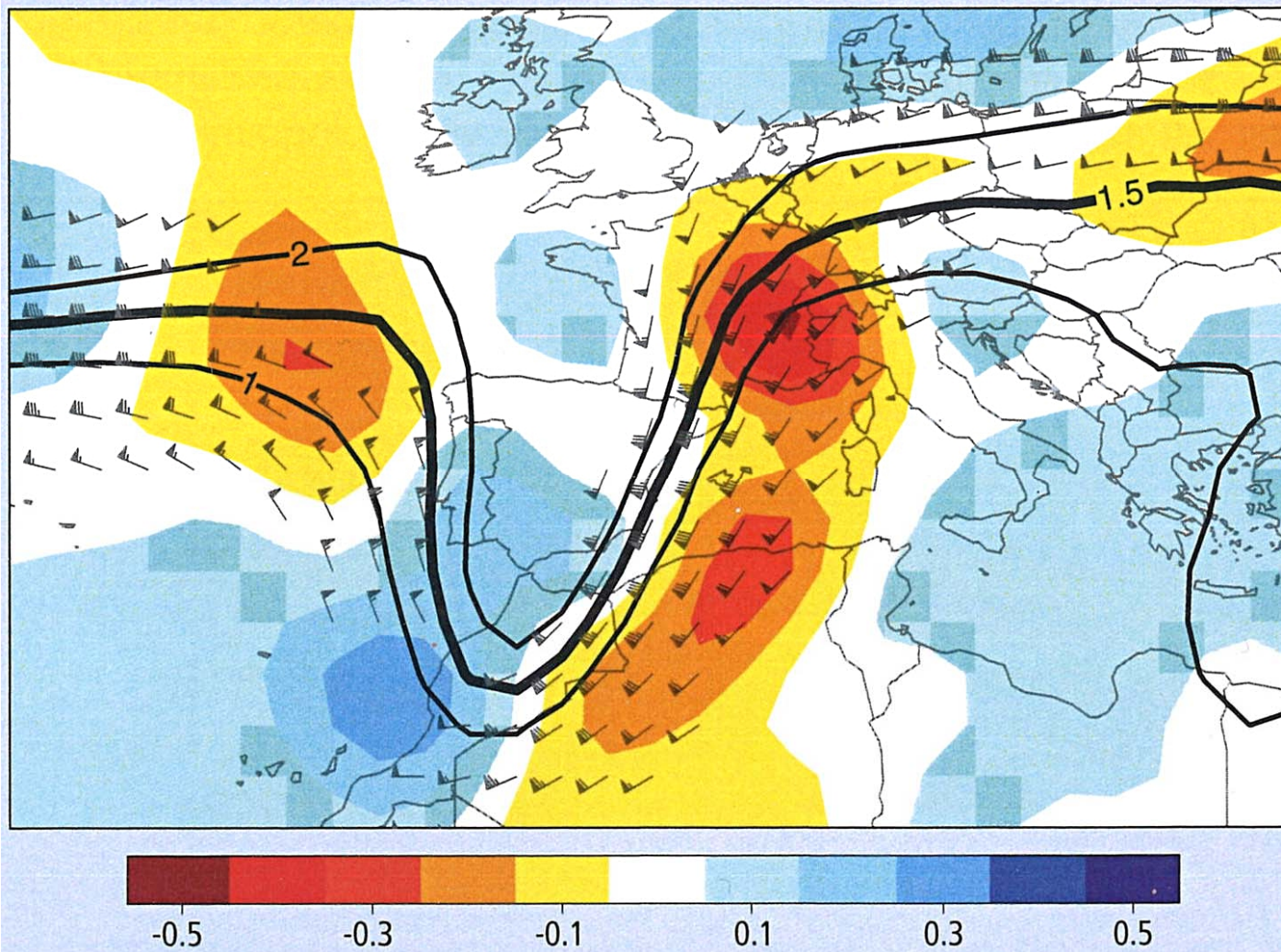
The flood of 1868

Reconstruction

- Heavy rain in late September and early October 1868
 - Massive low pressure weather coming from the western Mediterranean
 - Highest water level of Lago Maggiore in historical times
- Afflicted areas
 - Southern and eastern cantons of the Swiss Federation (Valais, Ticino, Grisons, St. Gall, Uri, Glarus)
 - Southwestern part of the Hapsburg Monarchy (Northern and Southern Tyrol, Trentino)
 - Northern part of the Kingdom of Italy (Piedmont, Lombardy)
- Extreme damage
 - According to C. Pfister (2009) the most expensive catastrophe in Switzerland between 1800 and 1987
 - 51 people killed

The flood of 1868

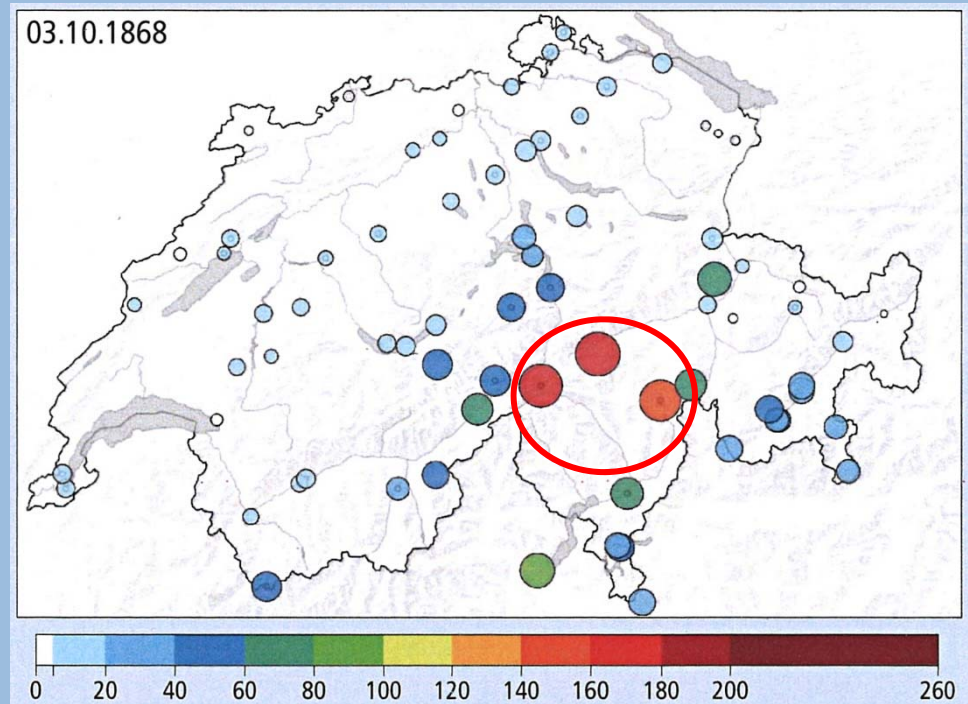
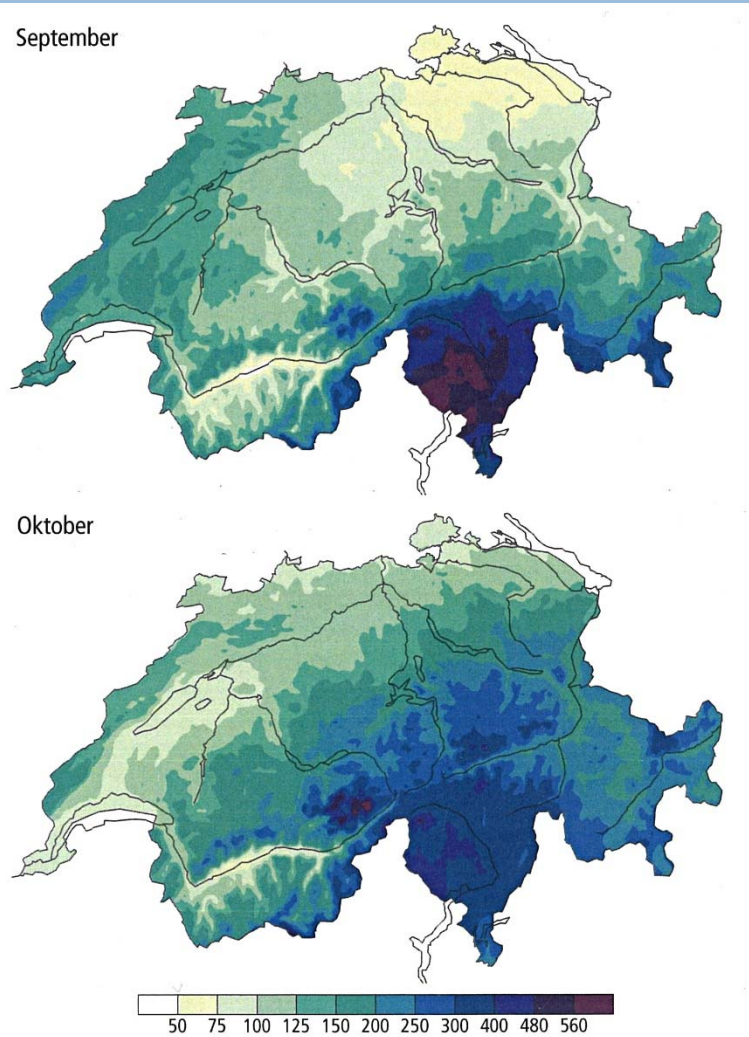
Reconstruction



The Weather situation with PV (potential vorticity) streamer on 3 Oct. 1868. Shades of colour show the vertical movement (red means elevation) of the air masses in the middle troposphere (500 hPa). Source: Brönnimann et al. 2018: 9.

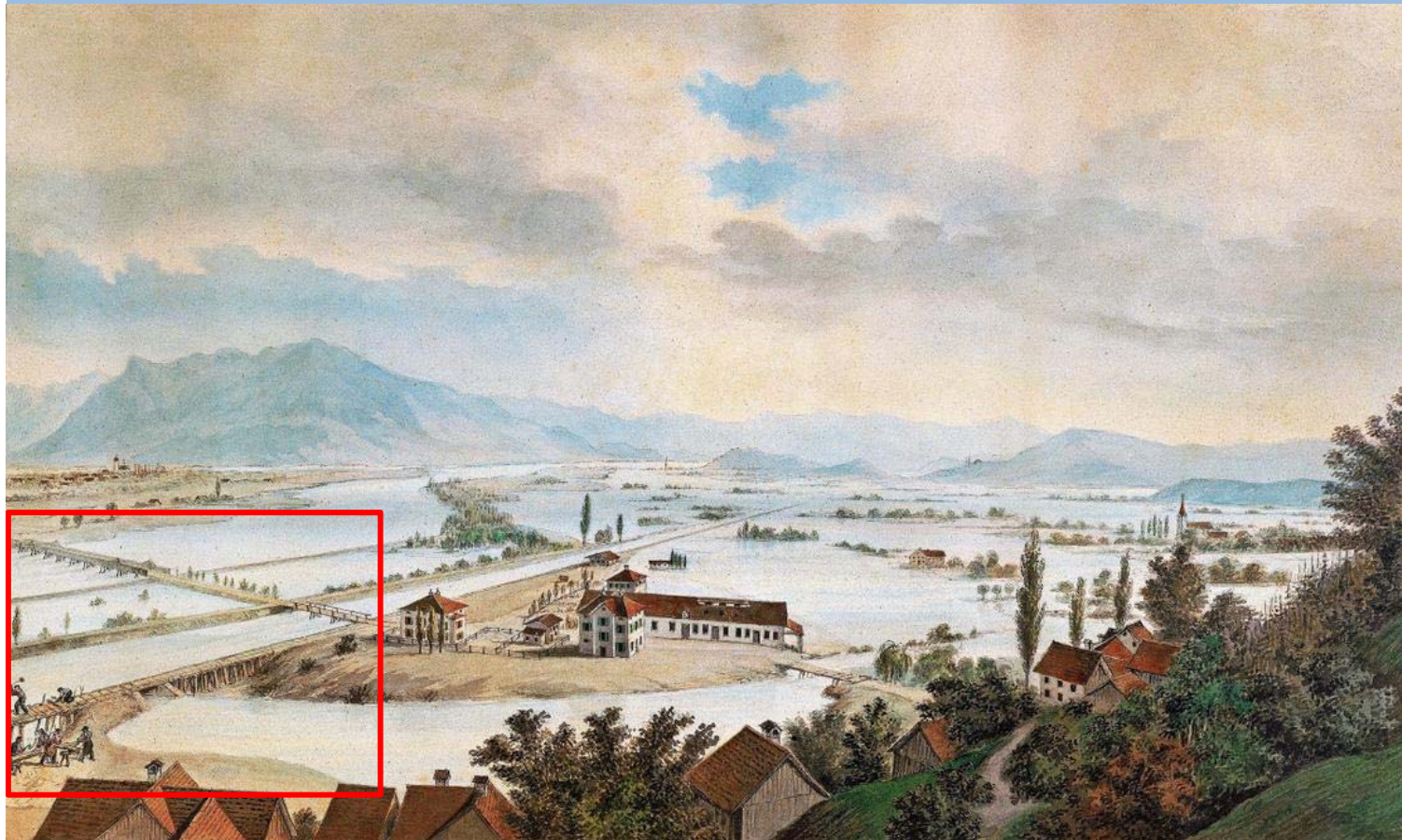
The flood of 1868

Reconstruction



Precipitation on 3 Oct. 1868 according to the measurements of the Swiss national meteorological network.
Source: Brönnimann et al. 2018: 21.

The flood of 1868 Reconstruction



The flood of 1868 in the Alpine Rhine Valley near Au (SG), anonymous water-colour painting, private collection, 1868. Source: Copy of the State Archive, St. Gall

The flood of 1868 Reconstruction



The flood of 1868 in Verbania, Lago Maggiore (left), town arcades with flood mark of 4 Oct. 1868 (right), photographs. Source: Brönnimann et al. 2018: 7.

The flood of 1868

Disaster management in Switzerland

- Existing flood prevention ineffective
 - Dams mostly broken
 - Bridges and roads flooded and/or destroyed (help reaches the afflicted areas only several days later)
- High level of solidarity within Switzerland and from abroad
 - Organized by the Swiss Federal Government to improve national coherence
 - Wave of donations (money, food, clothes)
 - Distribution works only partly
- Reconstruction of dams and other water protection starts shortly after the flood
 - “Wuhrmillion” (one million of Swiss Francs for protective measures)
 - Narrow-embankment protection system

The flood of 1868

Disaster management



Etching by Ed. Mockly, Geneva 1868. Source: Schweizerisches Bundesarchiv / Summermatter 2012: 208; Rohr 2018: 30.

The flood of 1868

Disaster management

APPELLO
del Comitato luganese di Soccorso alle vittime dell'alluvione del 27-28 spirante settembre

A

TUTTI I CITTADINI, CONFEDERATI E FILANTROPI.

Alla notizia dei disastri che colpirono la Leventina e le altre valli superiori, la Municipalità di Lugano, facendosi interprete dei sentimenti della intiera popolazione e nell'intento di organizzare e raccogliere pronti ajuti a quegli infelici fratelli, ha eletto noi sottoscritti a costituire un *Comitato di soccorso*.

Grati di tale fiducia non esitiamo ad assumere il generoso mandato; e ci rivolgiamo subito con pari confidenza ai nostri Concittadini e Confederati che sono dentro e fuori del paese natio e a tutti gli uomini sensibili ai dolori del proprio simile.

La sciagura che opprime Leventina e Blenio non ha paragone nella nostra storia; eppure non ne conosciamo ancora tutta l'estensione. Jeri sera appena ci giungevan le notizie di Bodio, or ora bello e florido villaggio, or precipitato nello squallore: tutto il pingue territorio devastato, case, cascine e bestiami travolti dalle acque, e dieciotto vittime umane! Ed oggi solo, tre giorni dopo, ci è dato sapere la rovina di Corzoneso, dove altre ventitrè persone perirono coll'intiero casale di Casserio. A Malvaglia altre cinque vittime umane, a Semione altre cinque.

Appeal for aid by the newly founded Aid Committee of Lugano for the support of flood victims in the Leventina and Blenio valleys, merged with a status report from the worst-hit region.

Source: Gazzetta Ticinese, 1 Oct. 1868: 897.

The flood of 1868

Political consequences in Switzerland

- Flood protection and forestry affairs still in the competence of the single cantons
- The deforestation paradigm
 - Swiss Forestry Association (“Schweizerischer Forstverein”) leads a decade-long debate on the consequences of deforestation in the mountains (published in the “Swiss Journal of Forestry”)
 - Deforestation seen as the main reason for floods in the valleys
 - Only the flood of 1868 makes this issue a task for federal and cantonal politicians
- Political consequences
 - Flood prevention and forestry affairs become tasks of the Federal State (Amendment of Art. 24 of the Swiss Federal Constitution, 1874)
 - Swiss Federal Forestry Act on high-Alpine forests (1876)
 - Swiss Federal Hydraulic Engineering Act (1877)

The flood of 1868

The situation outside Switzerland – Further research

- Detailed research only for the Swiss part of the flood of 1868
- Newspaper from Southern Tyrol and Piedmont show the high potential for further studies
 - How did the new Kingdom of Italy react on the floods?
 - Did the Hapsburg administration judge this event only as a regional one without major consequences for flood management in general?
 - Vulnerability of newly built railway routes (e.g. Brenner route from Innsbruck to Verona, opened in 1867)
 - Improvement of the climatological models (currently based on data of the Swiss national meteorological network)

Conclusions

- The flood of 1868
 - Well-examined case study, at least for Switzerland
 - Worst-case, transcending the boundaries of cantons and states
- Consequences
 - Scientific discourse on the impact of deforestation becomes an issue of politics as well
 - Fundamental changes in forestry and flood management legislation
 - Wave of solidarity in Switzerland strengthens the coherence of the Federation
 - Political consequences for the new Kingdom of Italy and for the Hapsburg Monarchy still to be examined

Thank you for your attention!

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