PAGES

FLOODS

FLOODS WORKING GROUP

Annual meeting

EGU – Vienna, April 11th 2018, 13.30-15.30

Annual meeting - Program

Introduction		Bruno Wilhelm
New structure and key actions		
WP1	Collecting, storing and sharing paleoflood data	Michael Kahle
WP2	Integrating and analysing paleoflood data	Lothar Schulte
WP3	Communicating and disseminating	Vic. Baker, Juan Ballesteros
Future trans-WP projects		
	Special Issue (Global and Planetary Change)	Lothar Schulte et al.
Strategy for the coming year(s)		
	Proposal preparation for the second FWG phase	Bruno Wilhelm

Floods WG

Oct 2015 2016 2017 2018

FLOODS

‘Past flood’ researchers

‘Analysis’ researchers

Leaders

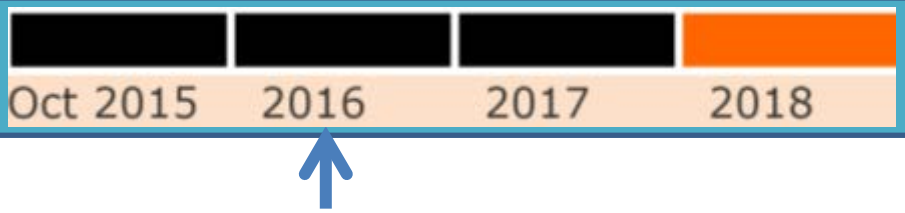
Bruno Wilhelm,
Juan Antonio Ballesteros Cánova

Scientific committee

Scott St. George,
Markus Stoffel,
Rhawn Denniston,
Blas L. Valero Garcés,
Achim Brauer,
Gerardo Benito,
Mark G. Macklin,
Lothar Schulte,
Neil Macdonald,
Manfred Mudelsee,

⇒ **Promote collaborations between all those communities**

⇒ **Foster ‘in-depth’ analysis of results and synthesis on past floods**



Workshop

‘Cross community workshop on past flood variability’

Grenoble, France, 27-30 June 2016

- **All workshop material available on the PAGES website**

Main objectives identified:

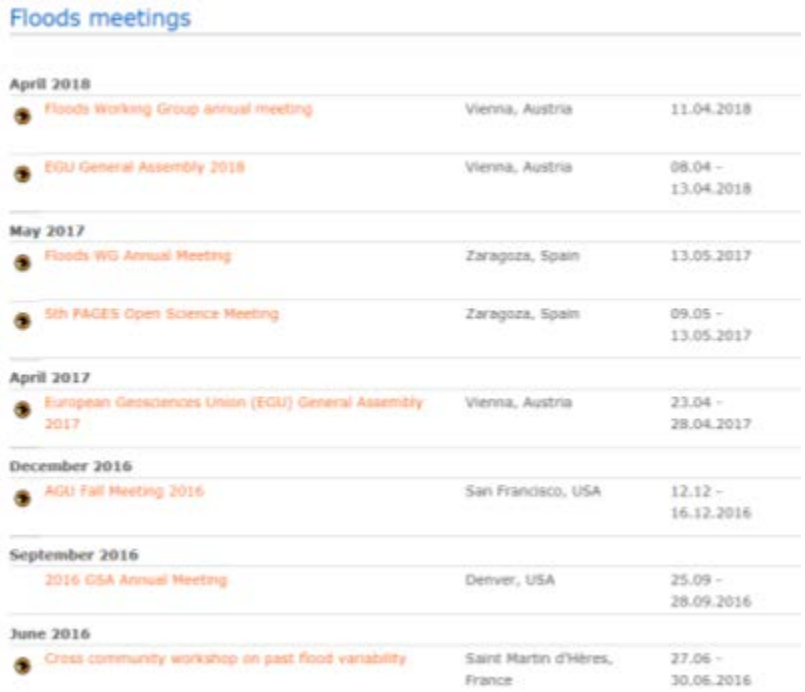
1. **Better know each other** (different communities)
2. **Identify, collect, store and share existing palaeoflood records**
3. **Actions to communicate on palaeoflood records to a broad audience**
4. **Identify and communicate on WG guidelines** (goals and actions)

1. Better know each other

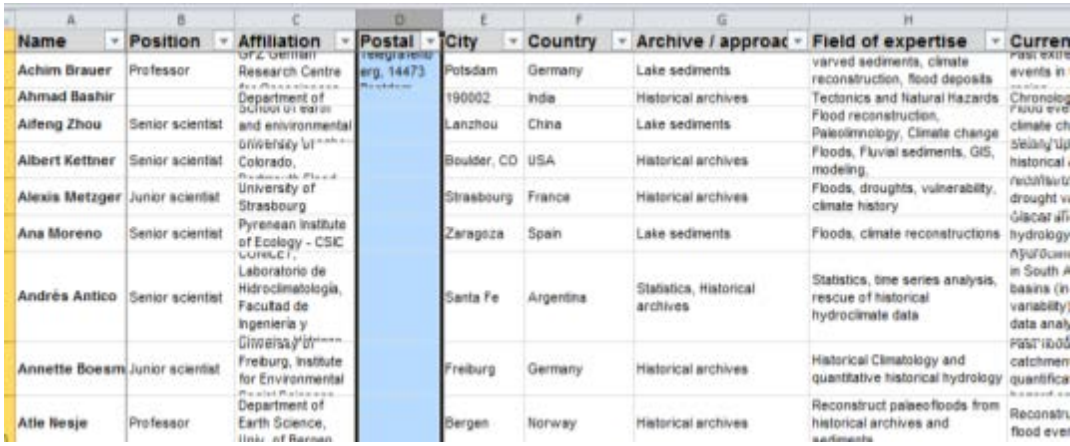
- Co-sponsoring of 6 sessions in conferences (EGU, AGU, GSA, OSM + proposal for INQUA 2019)

- Project 'Who is who' M. Alhborn -> V. Pellerito

100 detailed member profiles



http://pastglobalchanges.org/ini/wg/floods/meetings



Name	Position	Affiliation	Postal	City	Country	Archive / approac	Field of expertise	Curren
Achim Brauer	Professor	GFZ German Research Centre	erg, 14473	Potsdam	Germany	Lake sediments	varved sediments, climate reconstruction, flood deposits	
Ahmad Bashir		Department of		190002	India	Historical archives	Tectonics and Natural Hazards	
Aifeng Zhou	Senior scientist	and environmental		Lanzhou	China	Lake sediments	Flood reconstruction, Paleolimnology, Climate change	
Albert Kettner	Senior scientist	Colorado,		Boulder, CO	USA	Historical archives	Floods, Fluvial sediments, GIS, modeling,	
Alexis Metzger	Junior scientist	University of Strasbourg		Strasbourg	France	Historical archives	Floods, droughts, vulnerability, climate history	
Ana Moreno	Senior scientist	Pyrenean Institute of Ecology - CSIC		Zaragoza	Spain	Lake sediments	Floods, climate reconstructions	
Andrés Antico	Senior scientist	Laboratorio de Hidroclimatología, Facultad de Ingeniería y		Santa Fe	Argentina	Statistics, Historical archives	Statistics, time series analysis, rescue of historical hydroclimate data	
Annette Boesm	Junior scientist	Freiburg, Institute for Environmental		Freiburg	Germany	Historical archives	Historical Climatology and quantitative historical hydrology	
Atle Nesje	Professor	Department of Earth Science,		Bergen	Norway	Historical archives	Reconstruct palaeofloods from historical archives and	

http://pastglobalchanges.org/ini/wg/floods/people

2. Identify, collect, store & share palaeoflood records

- Building of database structure
- Metadata collection (ca. 400 records)

Figure: Mich

http://pastglobalchanges.org/ini/wg/floods/wp1/data

3. Actions to communicate on palaeoflood records

to a broad audience

- **Participation to workshops** (Future Earth E3S, Warmer worlds)
- **Publications**:

- ***Using Archives of Past Floods to Estimate Future Flood Hazards***
  Swierczynski et al. (2017) in *Eos* 98

- ***Interpreting historical, botanical, and geological evidence to aid preparations for future floods***
  Wilhelm & 22 authors (submitted) in WIRES Water

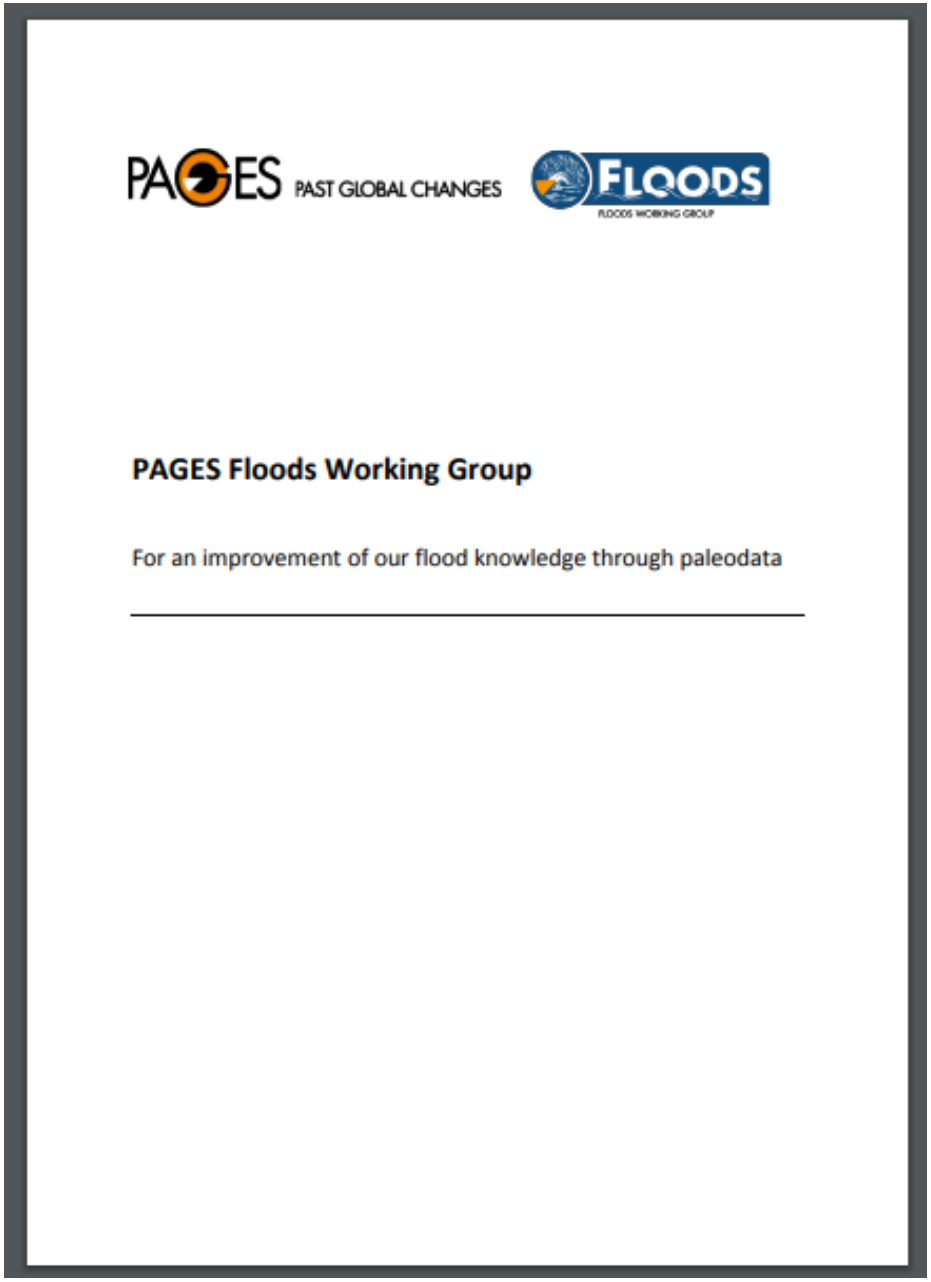
- ***Recent advances in paleoflood hydrology: from new archives to data compilation and analysis***
  Wilhelm & 8 authors (submitted) invited for Water Security

4. Identify and communicate on WG guidelines

White Paper (November 2017)

Written by 13 authors
Reviewed by members

Aims to structure
the working group activities,
actions and deliverables


PAGES PAST GLOBAL CHANGES FLOODS FLOODS WORKING GROUP

PAGES Floods Working Group

For an improvement of our flood knowledge through paleodata

http://pastglobalchanges.org/download/docs/working_groups/floods/fwg-white-paper-Nov-17.pdf

Annual meeting - Program

Introduction — Bruno Wilhelm

New structure and key actions

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Future trans-WP projects

Special Issue (Global and Planetary Change) — Lothar Schulte et al.

Strategy for the coming year(s)

Proposal preparation for the second FWG phase — Bruno Wilhelm

Strategy, activities, actions

WP1

'Collecting, storing and sharing paleoflood data'

Michael Kahle

A PAGES Floods WG core project

WP1: Collecting, storing and sharing paleoflood data

Albert-Ludwigs-Universität Freiburg

Michael Kahle [1], Rüdiger Glaser [1], Pierre Francus [2], Pages Flood WG [3]

1: Physical Geography, University of Freiburg
2: Institut National de la Recherche Scientifique
3: http://www.pages-igbp.org/ini/wg/floods/people

UNI FREIBURG

Goal

- From the Floods WG page:
- “Compile published data sets on floods for **open-access archiving** in order to facilitate the **visibility** of existing data and their **inter-comparison**”
- (http://www.pages-igbp.org/ini/wg/floods/scientific-goals -> iii)

- Necessary: Common Data Structure across Multiple Proxy Types

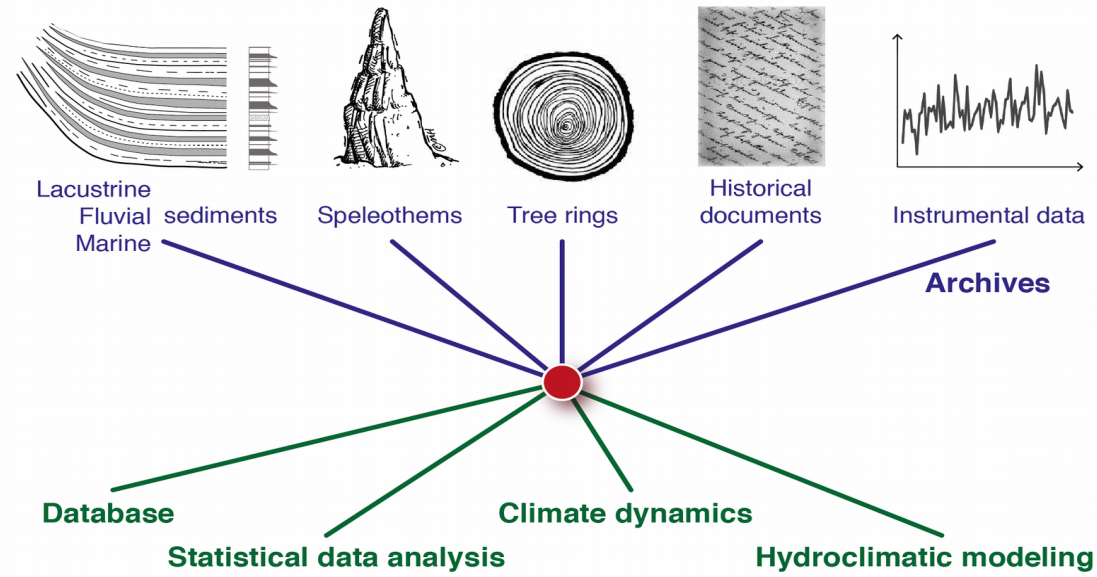
- If possible, use Sensor-Archive-Observation concept
  (Evans et al 2013 : https://doi.org/10.1016/j.quascirev.2013.05.024)

- http://pastglobalchanges.org/ini/wg/floods/wp1

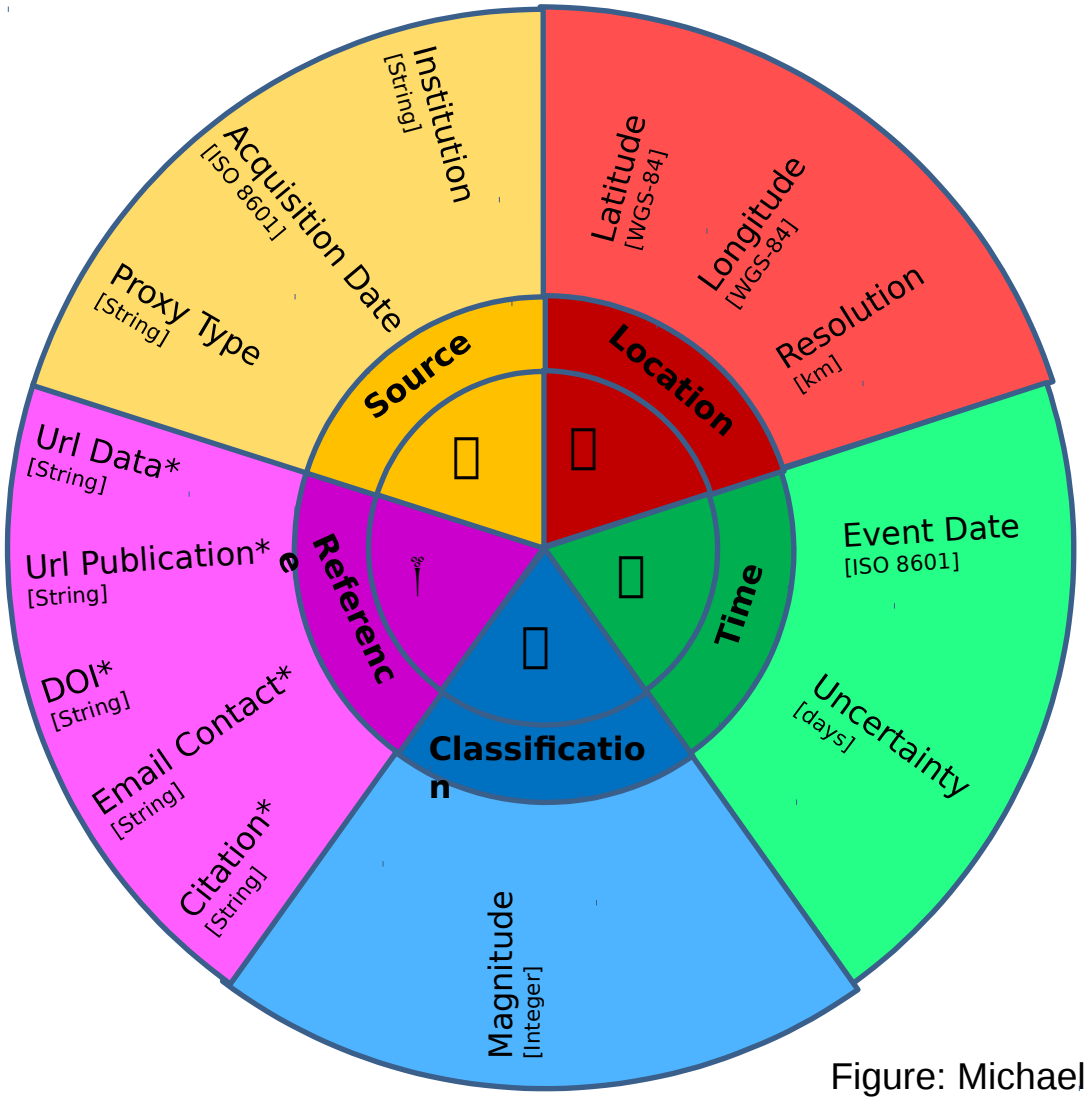
Floods Metadatabase

Everybody is welcome to contribute to the data pool:

- http://pastglobalchanges.org/ini/wg/floods/wp1/data
- More than 400 historical and paleoflood records worldwide.
- Different Proxy Types



Minimal Data Structure



Clusters

: Source

: Location

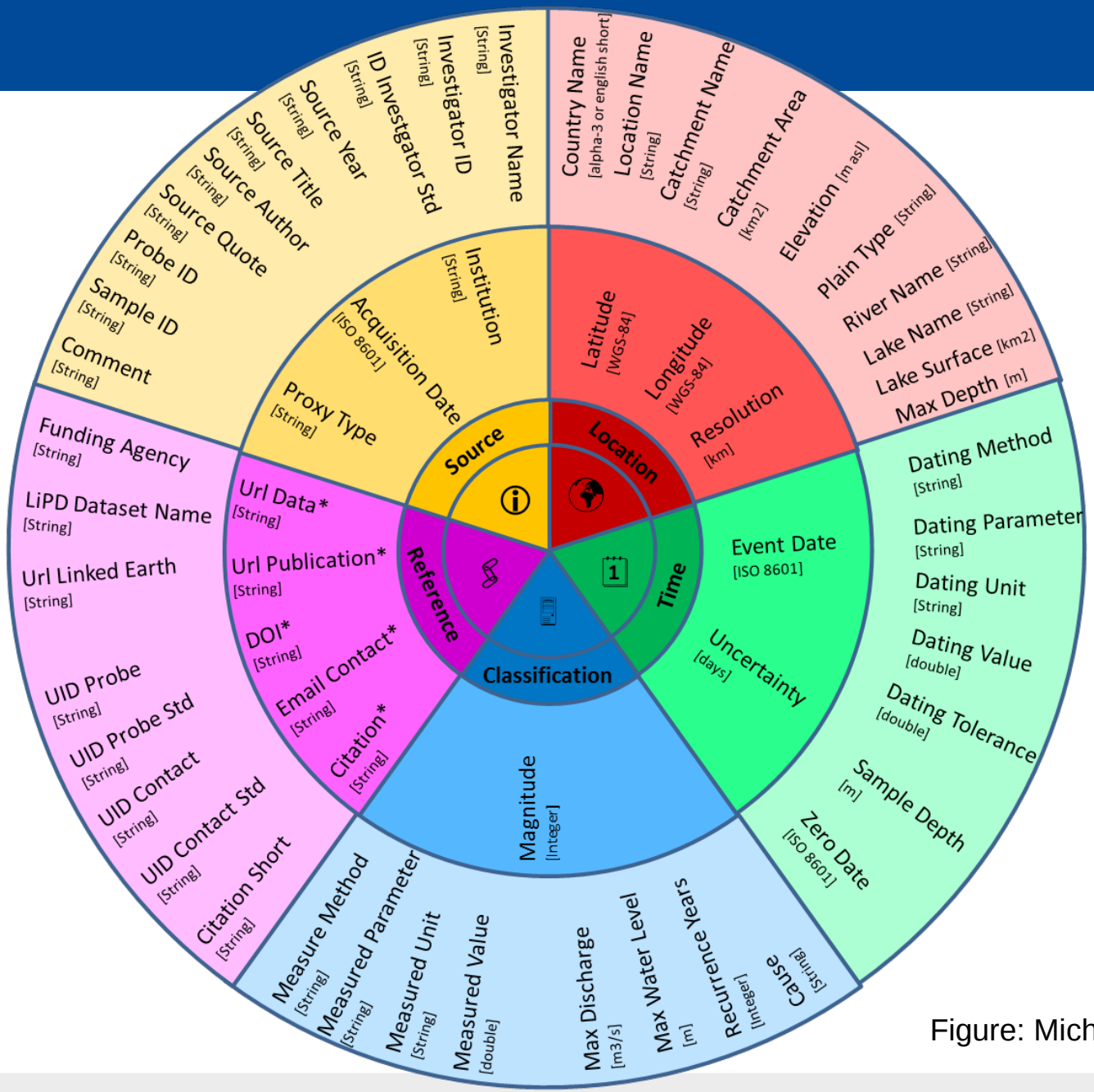
: Time

: Classification

: Reference

Figure: Michael Kahle 2017

Common Data Structure



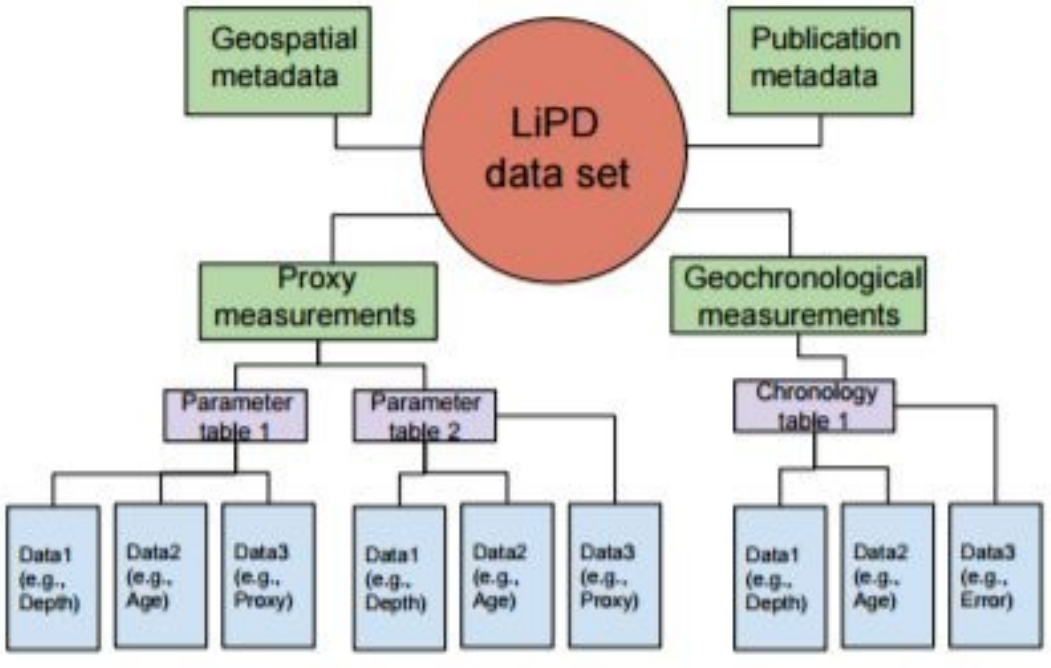
Clusters

- : Source
- : Location
- : Time
- : Classification
- : Reference

Figure: Michael Kahle 2017

Data Format: LiPD

Mixture of json and csv files in zip



https://doi.org/10.5194/cp-12-1093-2016
N. P. McKay and J. Emile-Geay

Advantage

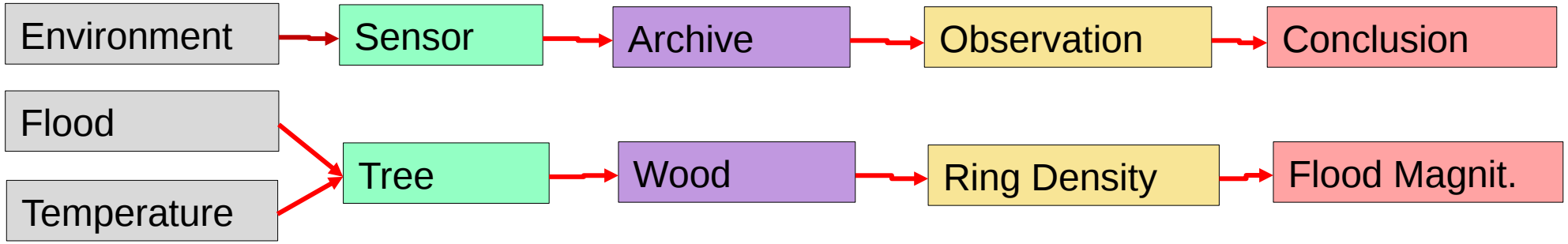
- Covers: Sediments, Speleothems, Tree rings, Measurements on fixed points, …
- Well established file format with tools available
- Fine structured

BUT - Enhancements needed for

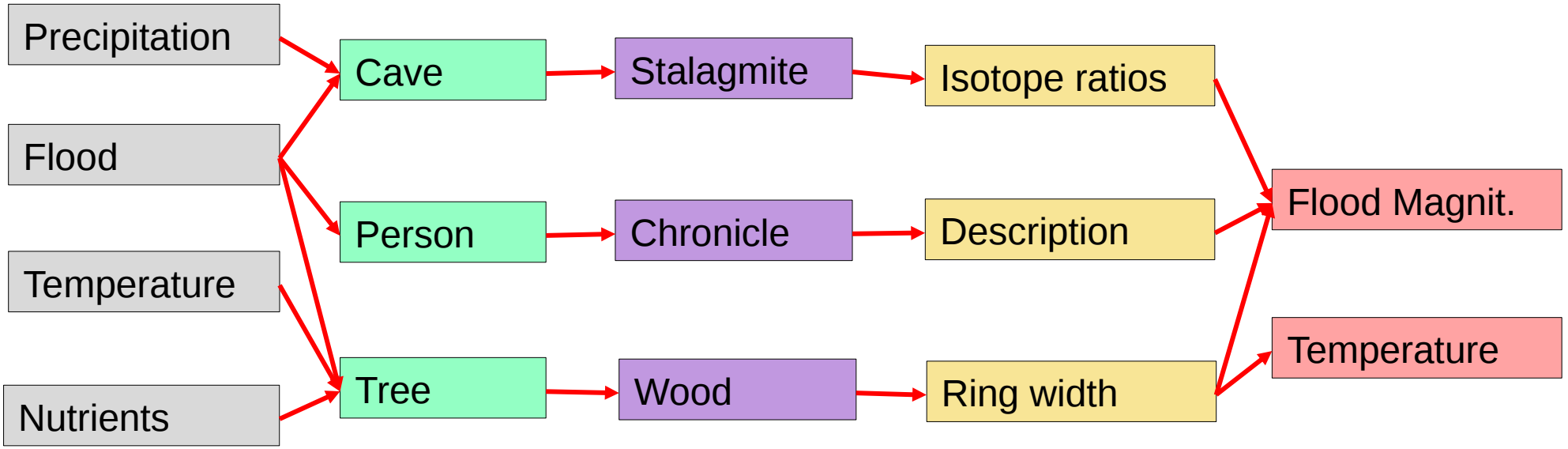
- Historical documents

Sensor, Archive, Observation

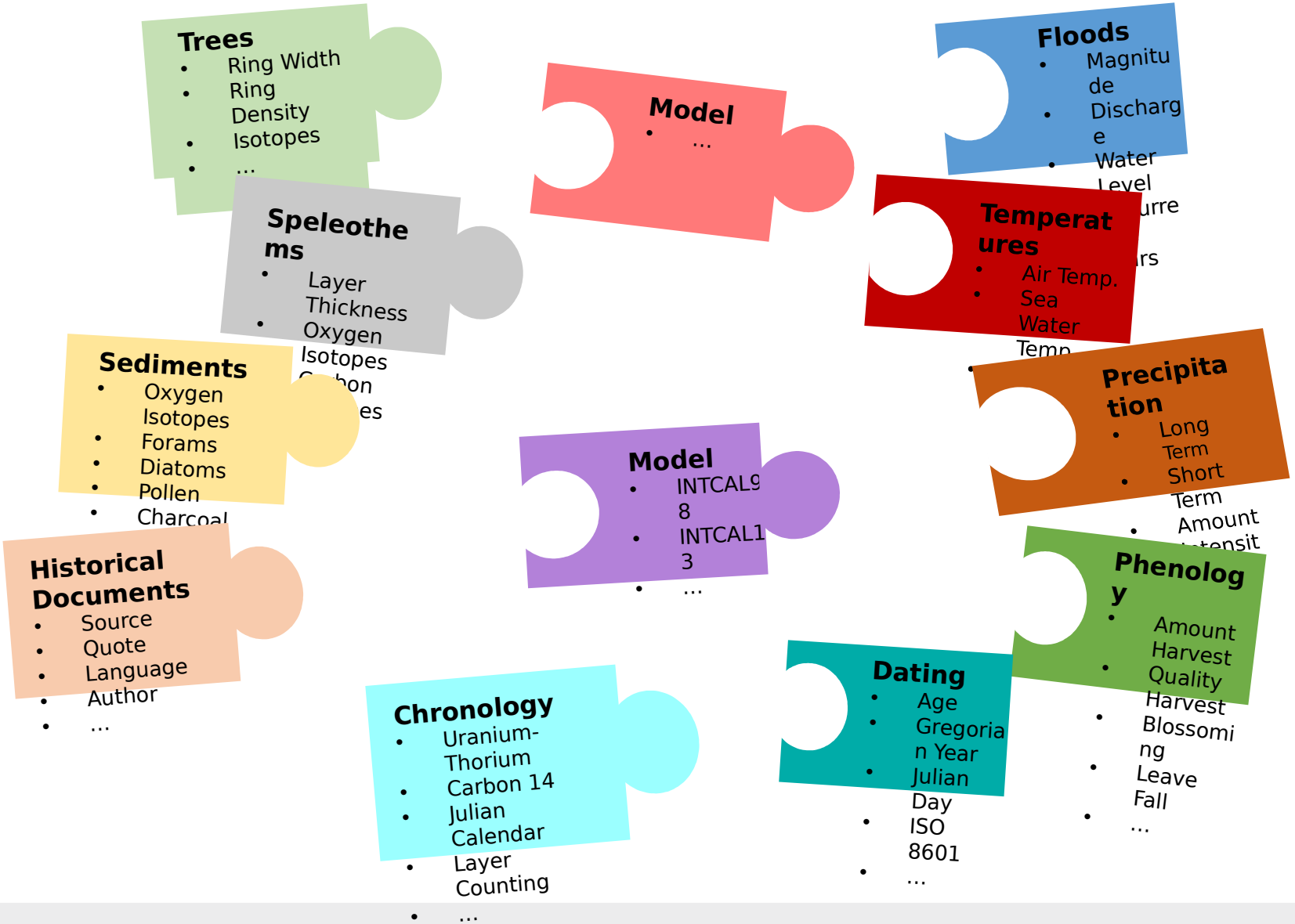
Single archive approach (by Evans et al 2013):



Multiple archive approach:



Proxy/Sensor in LiPD



Definition of LiPD Flood Format

Enhance LiPD format to store inferred flood data in a common way

(http://wiki.linked.earth/Category:Floods_Working_Group)

Enhance LiPD format to store observations from historical document archives

(http://wiki.linked.earth/Category:Historical_Documents_Working_Group)

All FWG members are invited to join the WG on Linked Earth and add feedback and/or comments there

(http://wiki.linked.earth/Category:Floods_Working_Group)

Next steps

Compile short example files (5-10 events) for each proxy type and provide it to the community

- **Your help is needed**: If you send me some example data, I can convert it to LiPD-format and upload it to the LiPD Wiki. Email: michael.kahle@geographie.uni-freiburg.de

- Later, LiPD tools will be available to convert/enter your data by yourself.

Strategy, activities, actions

WP2

'Integrating and analysing paleoflood data'

Lothar Schulte

Strategy, activities, actions

WP2: Integrating and analyzing paleoflood data

Coordinators: Lothar Schulte*, Manfred Mudelsee, Scott St George and Juan Carlos Peña

*schulte@ub.edu

The integrated study of "real-world data" on past floods derived from historical and natural archives (field data) is an excellent opportunity to document the low-frequency, large-magnitude flood events which have occurred under climate change and/or environmental conditions.

Actions:

i) Development of methodological approaches to integrate paleoflood datasets through regional pilot studies in different environments,

ii) Assessment of the contribution and improvements of flood frequency analysis through the use of multi-archive analysis,

iii) Development of methodological and statistical approaches to analyze paleoclimate models in relation to the flood variability,

iv) Investigation of changes in external forcing and atmospheric variability of the flood periods by paleoclimate modeling.

Work flow

2016-2018 Pilot project Bernese Alps (Advances presented at OSM 2017 and EGU 2018)

2017 Session on Multiproxy paleoflood reconstruction at PAGES OSM Zaragoza

2017-2018 Special Issue GLOPLACHA: Multi-proxy and multi-archive integration of paleofloods

2018/19 New regional projects

2018 Collaboration the Swiss initiative "Climate Change and its consequences on Hydrology in Switzerland Hydro-CH2018"

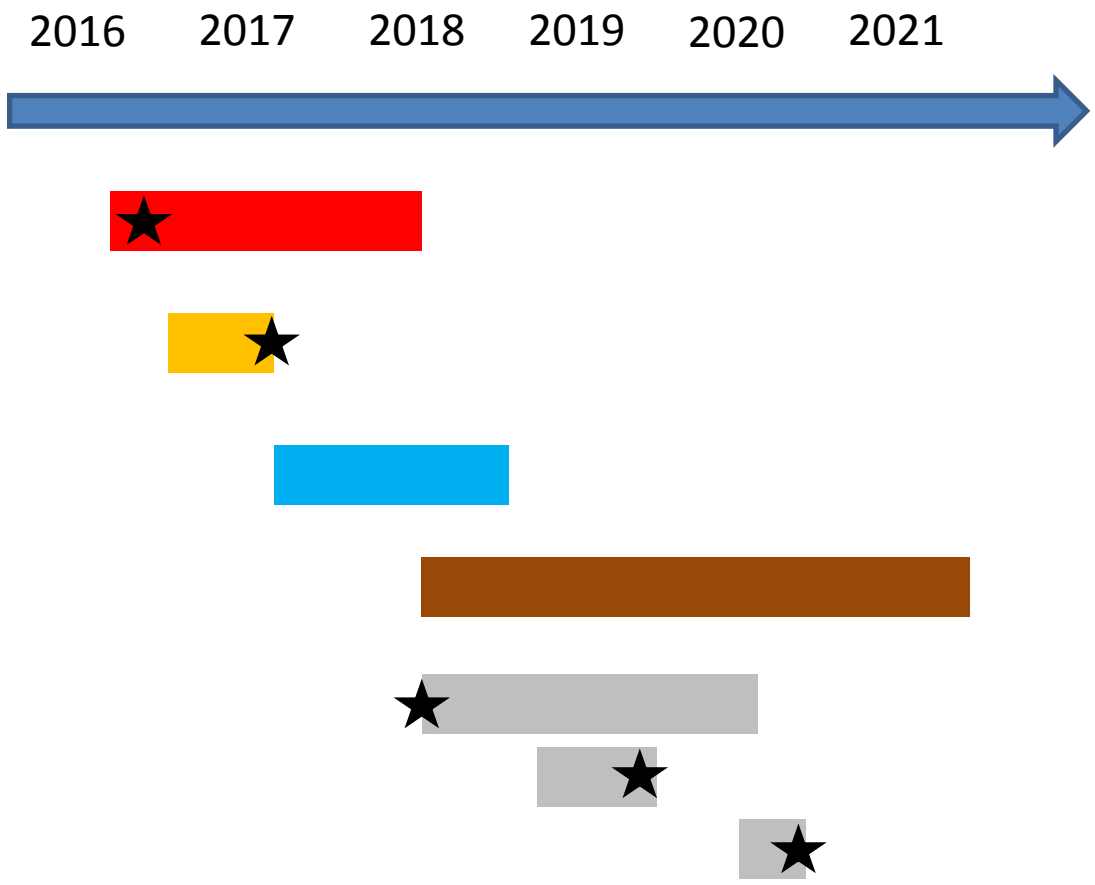
Strategy, activities, actions

WP2: Integrating and analyzing paleoflood data

Coordinators: Lothar Schulte*, Manfred Mudelsee, Scott St George and Juan Carlos Peña

*schulte@ub.edu

Work flow



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2019 INQUA Session

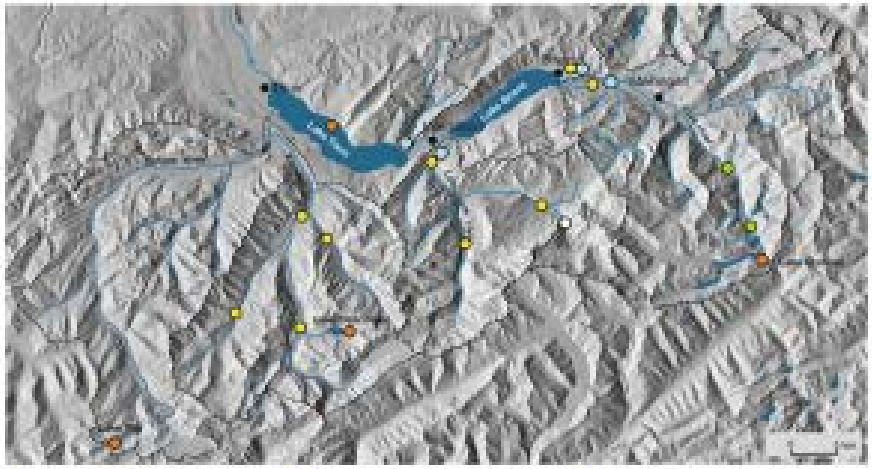
2020 Collaboration with the Paleoflood conference (?)

Strategy, activities, actions

WP2: Integrating and analyzing paleoflood data

Study area: Catchments in the alpine Bernese Aare

Location and type of archives



Lake records | Floodplain | Historical Flood damage | Lichenometry | Glacier

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	3451	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	3086
Lake Oeschinen	lake	21	1580	3663
Lake Grimsel	lake	5	1908	2641
Lake Iffigsee	lake	4,6	2085	3248
Eistlenbach	fluvial	4	644	2204

Problem definition: How to integrate multiproxy datasets?

Catchments size and geographical location?

Length of series and resolution?

Flood periods or single episodes?

Which proxies are suitable and robust flood signals?

Which series are comparable?

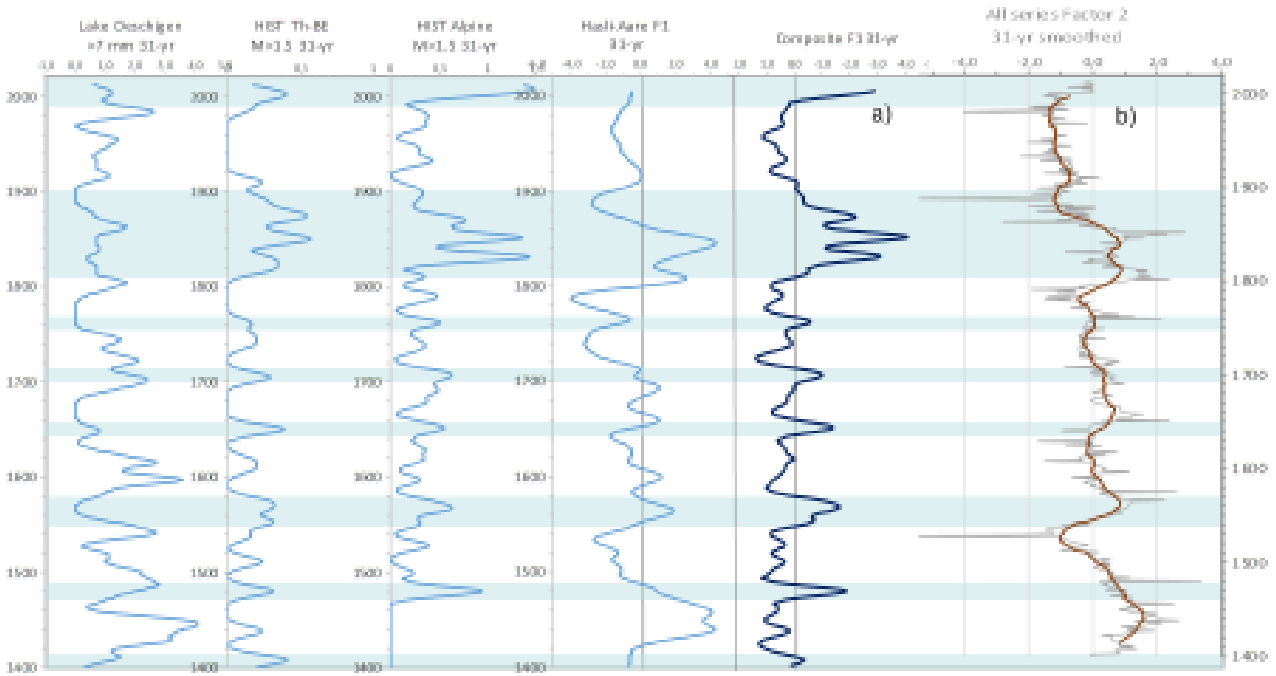
Similar or different sensitivity of proxies according to the regional settings, environment and processes.

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

Which series allow to reconstruct paleo-discharges?

Strategy, activities, actions

2nd step of integration: identification of flood trends according archive type



a) 31-yr smoothed plot of scores extracted by PCA from selected flood series of the Bernese Oberland (dark blue curve) vs. b) scores (annual and 31-yr smoothed; red curve) extracted from all individual flood series. a) Shows well defined flood pulses. b) shows different type of data structure (historical data and geochemistry)

Approach and results depend on:

- data selection/discrimination
- Thresholds
- Data structure and filters
- Aims (what do we aim to focus on?)

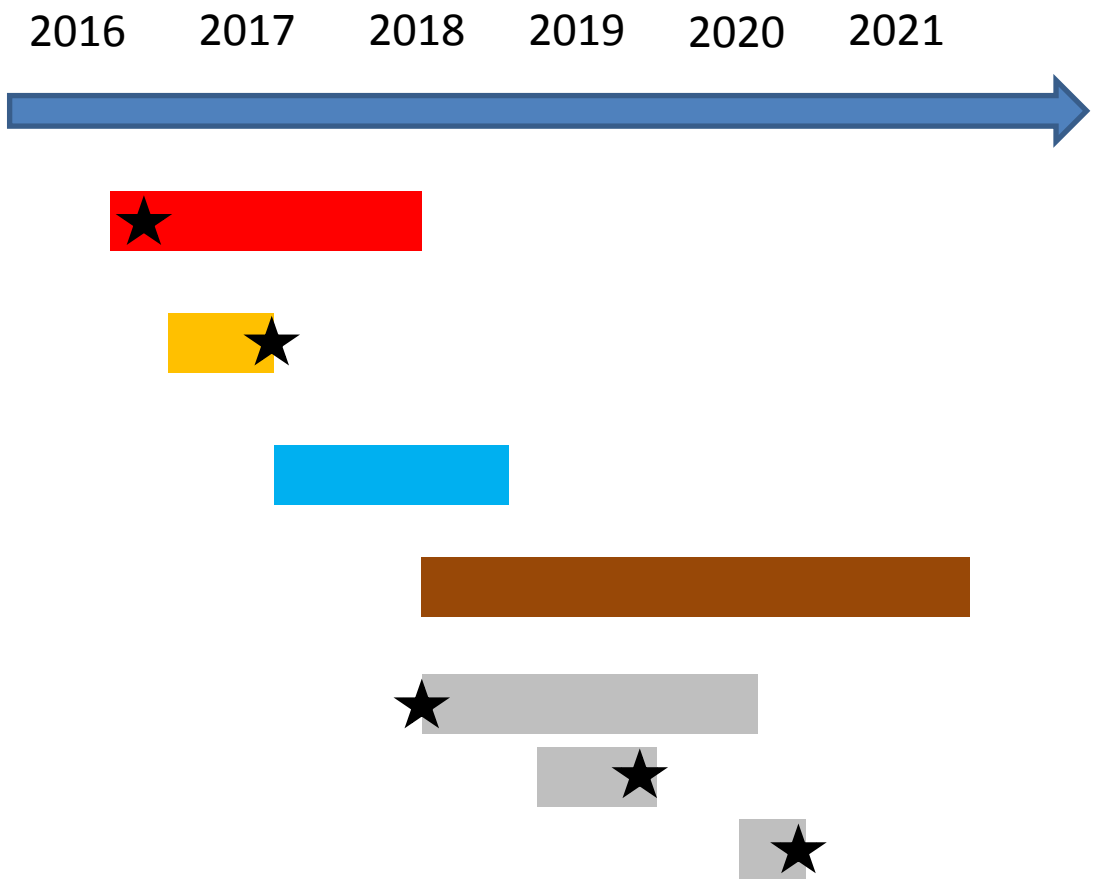
Strategy, activities, actions

WP2: Integrating and analyzing paleoflood data

Coordinators: Lothar Schulte*, Manfred Mudelsee, Scott St George and Juan Carlos Peña

*schulte@ub.edu

Work flow



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2020 Collaboration with the Paleoflood conference (?)

Strategy, activities, actions

WP2: Integrating and analyzing paleoflood data

Collaboration with other initiatives:

Hydro-CH2018 "Climate Change and its consequences on Hydrology in Switzerland Hydro-CH2018"

Past, current, and future changes in flood magnitude and frequency in Switzerland

Hydro-CH2018 synthesis report chapters:

„Future Changes in Hydrology"

Commissioned by the Federal Office for the Environment (FOEN)

Prof. Peter Molnar (ETH-IFU-Zurich) molnar@ifu.baug.ethz.ch
Dr. Virginia Ruiz-Villanueva (ISE-UNIGE) virginia.ruiz@unige.ch

Past, current, and future changes in flood magnitude and frequency in Switzerland

Time line and next steps

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Strategy, activities, actions

Palaeohydrology and Fluvial Archives - hydrological extreme and critical events (HEX)

Jürgen Herget (herget@giub.uni-bonn.de)
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Alessandro Fontana (alessandro.fontana@unipd.it)
Dept. of Geoscience, Padova University, Italy

Becky Briant (b.briant@bbk.ac.uk)
Dept. of Geography, Birkbeck University of London, United Kingdom

Lothar Schulte, Spain (schulte@ub.edu)
Dept. of Geography, University of Barcelona, Spain

Palaeohydrology addresses all components of the water cycle (rivers, lakes, groundwater, etc), although in practice most of the previous research has been focused on river channels and discharges, especially geomorphological and stratigraphic indicators of previous floods. Fluvial archives and landforms like river terraces and stacked fluvial sediments, alluvial fans, or lacustrine successions, tree-rings, speleothems and historical documents provide information of previous environmental conditions, including specific events and episodes. A hydrological event is defined as having a magnitude higher (flood) or lower (drought) than a critical threshold, including extreme events of significantly differing magnitudes. Events may be unique or clustered in time and can significantly mark the landscape. Eventually, a succession of extreme events may lead to alluvial terrace formation in addition to the traces of a distinct event itself, which can be well illustrated by outburst floods.
In the session, a multi-disciplinary approach will be applied by bringing together scientists from different disciplines for idea exchanges about:

- Extreme hydrological events, addressing the spatial and temporal patterns of extremes in different world regions using multi-archives and multidisciplinary perspectives.
- Collation and presentation of results from research on palaeohydrology and fluvial archives that are relevant for understanding and managing global environmental change.
- Human perception, resilience and response. For Holocene and historical events, consequences such as abandonment or shifting of settlements are important to assess the impact of floods or droughts and their magnitude and duration also recently and in the near future.
- New methods and techniques for palaeohydrological reconstruction, integration of data from different archives in a multidisciplinary database and Quaternary river evolution, such as remote sensing, geochronology, modelling, numerical simulation, geochemical and isotopic analysis, which are constantly developed and further improved.

The session is organised in cooperation of the groups of Global Continental Palaeohydrology GLOCOPH, Fluvial Archives Group FLAG, forming the INQUA International Focus Group HEX of the same title like the session has and the PAGES Flood Working Group FWG.

It is the aim of the organisers of the session to publish the contributions in a special issue of Quaternary International.

INQUA 2019
Dublin 25-31/07/2019

Joint session:

- Global Continental Palaeohydrology GLOCOPH,
- Fluvial Archives Group FLAG,
- INQUA International Focus Group HEX
- PAGES Flood Working Group FWG.

Strategy, activities, actions

6th International Palaeoflood Conference New Zealand 2020 27 Jan – 7 Feb*

- 2 day Pre-conference fieldtrip (27-28 Jan): Central North Island volcanic breakout floods
- 3 day Conference (29-31 Jan)
  - papers & posters hosted by Massey University, Palmerston North
  - Fieldtrip: Manawatu and Whanganui flood histories
- 6-7 day Post-conference fieldtrip (1-7 Feb): South Island alpine floods and flood histories (glaciers, alluvial fans, lakes, gorges, braidplains)

Pre-conference fieldtrip to start in Auckland

Post-conference fieldtrip to finish in Christchurch

*All Dates are provisional

Expressions of interest: Prof. Ian Fuller, Massey University
i.c.fuller@massey.ac.nz

Strategy, activities, actions

WP3

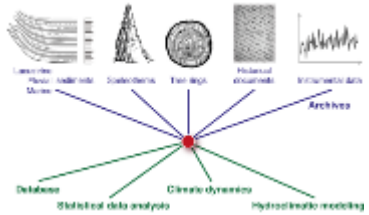
'Communicating and disseminating paleoflood science'

Juan Ballesteros

Strategy, activities, actions

Work Package 3: Communicating and disseminating paleoflood science

Paleoflood community



Engineering & Classical hydro.

Stakeholders

Don’t miss engage with classical hydrologist , point the focus on stakeholders

<u>Specific Actions:</u>

- Meetings with Stakeholders in Brussels (Com. EoU) 2016, 2018
- Analyses study cases showing add value of paleofloods in a compressive way (in collaboration with St. George)
- Design Scientific Brief
- Explore the possibility of a COST-action H2020

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Future trans-WP project

GLOBAL AND PLANETARY CHANGE

AUTHOR INFORMATION PACK

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ISSN: 0921-8181

DESCRIPTION

An ever changing **global system** defines the scientific and social problems and issues of our time. The majority of these problems clearly cross traditional scientific boundaries.

The objective of the journal *Global and Planetary Change* is to achieve a multidisciplinary view of the causes, processes and limits of variability in **planetary change**. The journal focuses on the record of change in **earth history** and the analysis and prediction of recent and future changes. Topics include, but are not limited to, changes in the **chemical composition** of the **oceans** and **atmosphere**, **climate** change, **sea level** variations, **human geography**, global **geophysics** and **tectonics**, global **ecology**, **biogeography**, **sustainability** and **resilience**.

Key criteria for manuscripts are global scope or implications for global scale problems, significance beyond a single discipline and a focus on the causes, processes and limits of planetary change. Manuscripts can be submitted as either research contributions or as review articles. Extra effort should be directed towards presenting problems and results for a broad readership. Part of the intent of *Global and Planetary Change* is for new discoveries or progress in one discipline to foster advances, or act as a catalyst, in understanding the earth as a system.

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Please see our Guide for Authors for information on article submission. If you require any further information or help, please visit our Support Center

AUDIENCE

Earth Scientists, Oceanographers, Atmospheric Scientists, Geographers, Biologists.

IMPACT FACTOR

2016: 3.915 © Thomson Reuters Journal Citation Reports 2017

Special Issue

Pluridisciplinary analysis and multi-archive reconstruction of paleofloods

Guest-editors: Lothar Schulte, Daniel Schillereff and Juan I. Santisteban

- *Papers:*

1. Schulte, L.; Schiellereff, D.; Santisteban, J.I.: **Challenges of pluridisciplinary analysis and multi-archive reconstruction of paleofloods** (Introductory paper)
2. Santisteban, J.I.; Mediavilla, R.: **Uncertainties associated to the study of paleofloods in a complex fluvial wetland in central Spain: autocyclic, allocyclic factors and time.**
3. Rapuc, W.; Sabatier, P., Fabien, A.; Palumbo, A.; Develle, A.L.; Reyss, J.L.; Laurent, A; Régnier, E., Piccin, A.; Grafenstein, U. v.: **16 kyr record of flood and environmental changes in Southern Alps (Lake Iseo, Italy).**
4. Evin, G.; Wilhelm, B.; Jenny, J.P.; Favre, A.C.: Bayesian MCMC flood frequency analysis integrating paleoflood data
5. Corella, J.P.; Valero-Garcés, B.; Benito, G.: **A millennium-long perspective of seasonal sediment delivery ratio during extreme run-off events in small Mediterranean watersheds.**
6. Lombardo, U., Ruiz-Pérez, J., Rodrigues, L., Mestrot, A., Madella, M., Veit, H.: **Fluvial dynamics controlled Holocene land cover in south-western Amazonia.**
7. Schulte, L.; Wetter; O.; Wilhelm, B.; Peña J.C.; Amann, B.; Wirth S.B.; Glur, L.; Carvalho, F.: **Integration of multi-archive datasets to reconstruct a comprehensive paleoflood picture in alpine catchments.**
8. Barriendos, M.; Alberola, A.; Balasch, J. C.; Gil Guirado, S.; Pino, D.; Tuset, J.; Castelltort, X.; Mazón, J.; Pérez Morales, A.; Ruiz-Bellet, J.L.: **Flood events chronologies for Spanish Mediterranean coast from documentary sources (14th-20th centuries). Updated series for palaeoclimatic analysis and interaction with social factors.**
9. Peña, J.C.; Schulte, L.: **A paleoclimate model of the atmospheric variability related to flood frequencies in the Hasli-Aare river, Swiss Alps from 1300 to 2010 AD.**
10. Agatova A.R., Nepop R.K.: **Pleistocene fluvial catastrophes and Holocene hydrological system transformation in now arid NW areas of Mongolian Inland Drainage Basin.**
11. Sánchez-García, C.; Schulte, L.; Peña, J.C.; Carvalho, F.: **Historical floods and climatic variability in southeastern Spain.**
12. Schillereff, D.N.; Chiverrell, R.C.; Macdonald, N.; Hooke, Janet M.: **Dual methodological reconstruction of late-Holocene flood frequency in northwest England: challenges, drivers and uncertainties.**
13. Støren, E.; Steffensen, I.; Dahl, S.O.: **Holocene river floods in Glomma, southern Norway.**
14. Zaginaev, V., Ballesteros-Cánovas, J.A., Erokhin, S., Meleshko, A., Stoffe, M.: **Regional glacier lake outburst floods and debris flow activity reconstruction in northern Tien Shan.**
15. Fuller, I.C., Macklin, M.G., Norton, K., Turner, J., Toonen, W., Lukens, C., Malloy, C.: **Flood sedimentation in the Whanganui River, New Zealand: a record of storms, landslides and lahars over the past ~1800 yr.**
16. St. George, S.: **The societal value of historical and paleoflood research in Manitoba, Canada.** (3000-word Viewpoint article)

Future trans-WP project

Timelines

The average timeline for Special Issue publication based on historic data for article submission/review and issue production and related titles are provided below:

Stage	*Time*
Paper submission	3-6 months
Reviewing process and revision submission	6-9 months
Production process (online publication)	2-3 months
Total	11-18 months

Please set the timeline for your Special Issue based on the above data and your experiences:

- First submission date (*Please enter the date the first submission is expected*):

  15st February 2018

- The date by which all papers should be submitted to the Guest Editors for review and the EVISE® submission site will be closed (*First Submission date +Time for Paper submission as listed above*):

  Extended to 30th June 2018

  31st May 2018

- The date by which all manuscripts should be fully reviewed and final decisions made on all manuscripts; and those failed to meet the deadline may be excluded (*Submission Deadline +Time for Reviewing process and revision submission as listed above*):

  15th October 2018

- The date the Special Issue is expected to be published (*Acceptance Deadline +Time for production process*):

  15th December 2018

Strategy for the coming year(s)

Proposal preparation for the second FWG phase

Juan Ballesteros & Bruno Wilhelm

- To be submitted in **October 2018**
- Content based on the **White Paper**
- Possible changes in the “leading group”

- **How involving motivated people more?**
- **Any feedback, recommendations?**
- **Interest to contribute, propose, coordinate a project?**