Results Workshop 3: Extreme events (floods and low flow events)

Question Matrix

Aspect/Question	Ongoing/Recently finished research activities	Research gaps	Research priorities
Drivers of variability in extreme events (Q1)			
Future changes in extreme events (including uncertainty assessment) (Q2)			
Future changes in sediment inputs and bedload transport during extreme events (Q3)			
Consequences of extreme low flow events (including recovery after dry spells), aridity indices (Q4)			
Open			

Known research activities

Name	Institution	Contact	Keywords	Matrix	Further information
Meteorological characterization of floods in Switzerland	Uni Bern	Olivia Romppainen	PhD Thesis P. Froidevaux	Q1	http://www.hydrologie.unibe.ch/download/640_Froidevaux.pdf
Rain on snow events	OCCR, Uni Bern	Ole Rössler		Q1	http://boris.unibe.ch/57941/1/hess-18-2265-2014.pdf http://www.hydrologie.unibe.ch/projekte/poster/Poster_PROBST.pdf
CRUEX	EPFL (LCH)	Anton Schleiss	Estimation of PMP-PMF for Switzerland (including PMP maps for CH, but not addressing the issue of CC)	Q1	http://www.crealp.ch/fr/accueil/thematiques/hydrologie/projets/crues-exeptionnelles-et-extremes.html
NIDEX (current climate)	MCH?			Q1	
CH2011+ extensions	MeteoCH	Rajczak et al. 2013		Q1	http://onlinelibrary.wiley.com/doi/10.1002/jgrd.50297/abstract
Precipitation extreme maps based on Bayesian Hierarchical Model	MeteoCH	C. Frei		Q1	
Relevant stages for delivering low flows	ETHZ	Kirchner, Näf, Stocker		Q1	
WCRP Grand Challenge on extremes					http://www.wcrp-climate.org/grand-challenges/gc-extreme-events
WCRP Grand Challenge on water availability					http://www.wcrp-climate.org/grand-challenges/gc-water-availability

EU-FP7 Drought-R&SPI					http://www.eu-drought.org/
CMIP6 IPCC AR6 experiments LUMIP					https://cmip.ucar.edu/lumip http://www.geosci-model-dev.net/9/2973/2016/
EU-FP7 EUCLEIA					http://eucleia.eu/
H2020 CRESCENDO					http://crescendoproject.eu/
SNF SwissSmex	ETHZ	Sonia Seneviratne			IAC ETH
Rainfall extremes characterization using radar data	Uni Bern	Olivia Romppainen, Luca Panziera	Return periods, different spatio-temporal scales	Q1	
Dendrology – WS2			Droughts/drivers	Q1	
Future changes EXAR Extreme Event in Aare and Rhine River	BAFU			Q2	http://www.bafu.admin.ch/naturgefahren/01916/13197/index.html?lang=de
Moisture fluxes towards the Alps and how they will change in the future	Uni Bern	Olivia Romppainen	PhD Thesis by Valérie Fazan	Q2	http://www.geography.unibe.ch/ueber_uns/personen/fazan_valrie/index_ger.html
Downscaling methods and uncertainty	OCCR, Uni Bern	Pascal Horton		Q2	
NRP70 - Monatsvorhersagen Wasserressourcen/ Trockenheit	WSL	Massimiliano Zappa		Q2	WSL SNF
Rain on snow (BAFU)	SLF	Tobias Jonas		Q2	SLF
Abflussprozesse während Hochwasser	WSL	Massimiliano Zappa		Q2	
Drought.ch (BAFU)	MCH, BAFU, WSL	NCCS		Q2	http://www.drought.ch/ http://www.wsl.ch/fe/wisoz/projekte/drought/index_DE
Sediment			Wasserkraft und Klima	Q2	

Prozessketten	SCNat, SLF	Urs Neu, Martin Bründler		Q2	
CCHydro	BAFU		Es wurden auch Extremereignisse ausgewertet von WSL und von anderen Mitwirkenden	Q2	http://www.bafu.admin.ch/wasser/13465/13483/14088/15086/index.html?lang=de http://www.bafu.admin.ch/publikationen/publikation/01670/index.html?lang=de
BAFU Projekt: Intense precipitation & extreme floods	ETHZ	Felix Näf, Heini Wernli		Q2	http://www.bafu.admin.ch/wasser/13465/13483/14088/15086/index.html?lang=de
Hail climatology	Uni Bern, MeteoSchweiz	Olivia Romppainen, Urs Germann	Research on expected changes on hail frequency	Q2	Uni Bern http://www.readcube.com/articles/10.1002/qj.2771
Hydro-Meteorological processes and „ingredients" of historical floods since 1817	Uni Bern	Stefan Brönnimann, Peter Stucki, Ole Rössler	Numerical simulation/Peaks Basel/Maggiore	Q2	
ERC Drought-Heat	ETHZ			Q2	http://www.drought-heat.ethz.ch/
Future climate simulations with global and regional model	ETHZ	Christoph Schär, Reto Knutti		Q2	
Downscaling to 2km-grid of period 2002-2007, including floods and drought periods	OCCR, Uni Bern	Stefan Brönnimann		Q2	
Low Flow – Groundwater Project	BAFU, Uni NE – CHYN Uni ZH Uni Freiburg i.Br.	Petra Schmocker, Philip Brunner, Jan Seibert, Markus Weiler		Q4	Uni Neuchatel Uni Zürich Uni Freiburg i.Br.

Common platform for environmental data EnVIS	Canton of Aargau	Christophe Lienert		Q5	Kanton Aargau

Research gaps

- ET, Delta ET (Q1)
- Land use → low flows (Q1)
- Low flows: Identification and classification of storages relevant for low flows (ETH: Stocker, Kirchner, Naef) (Q1)
- Frequency of extreme events based on meteorological simulations (Q1)
- Soil maps (Q1)
- Coupled land use/hydro models (Q1)
- Multi-hazard-forecasts (HW, droughts, sediment, landslides, wildlife) (Q1)
- Stationary weather situations that lead to floods/droughts (Q1)
- Geology, Hydrogeology (conductivity) informations (Q2)
- Analysis of climate simulations from "event perspective" (Q2)
- Duration of low flows (Q2)
- Availability of aridity indices (Q2)
- Uncertainties on discharge design taking into account climate change (Q5)
- Recommendations for practiticioners and cantonal administrations (current state of knowledge): Accounting for extreme events, change in design (life duration 30y to 80y) (Q5)
- Availability of Q347 in ungauged basins → restrictions of water extractions (Q5)
- Assess overall reliability chains of models (Q5)

Research priorities

- Socio-economic changes vs. Climate change

- Definition of hydrological extreme events (soil moisture, groundwater, snow), consequences must also be considered

- Process chains in hydrological extremes
- Priorities for Hydro-CH2018: other extremes than floods, no good strategies for «other» extremes

- Adaptation to floods relatively good compared to other extremes