

flooddynamics.ch – Spatiotemporal dynamics of extreme flood events in Switzerland

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BASEMENT Users Meeting

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- > Objectives
 - > Data
 - > Preprocessing
 - > Postprocessing
 - > Webtool flooddynamics.ch (prototype)

- Dynamic visualization of the whole modelling chain -> precipitation to damage
- Risk dialog and contribution to risk communication
- Increasing risk awareness
- Basics for creating emergency planning scenarios
- Risk management for critical infrastructure (e.g., Swisscom, BKW, Coop -> stress tests)

Target groups:

- Blue-light organizations
 - Civil protection
 - ASTRA, SBB,
 - Energy & water suppliers,
 - Major distributors of food
 - ...
- > focus on specialist



> **Meteo data:**

- IFS hindcast archives (~8'000 years)
- CombiPrecip
- Cosmo Rea2 & Rea6

-> Event extraction, return periods of 100, 300 and 1'000 years over a 1-5 or 10 day accumulation period

> **Runoff data:**

- FOEN, Cantons and neighbouring countries
- > calibration of hydrological model (DECIPHeR)

> **Cross-section data**

- FOEN (rivers of national interest)
 - Axpo AG, Eniwa AG, Alpiq AG, IRR
- > BASEchain (-> BASEMENT v.2.8)

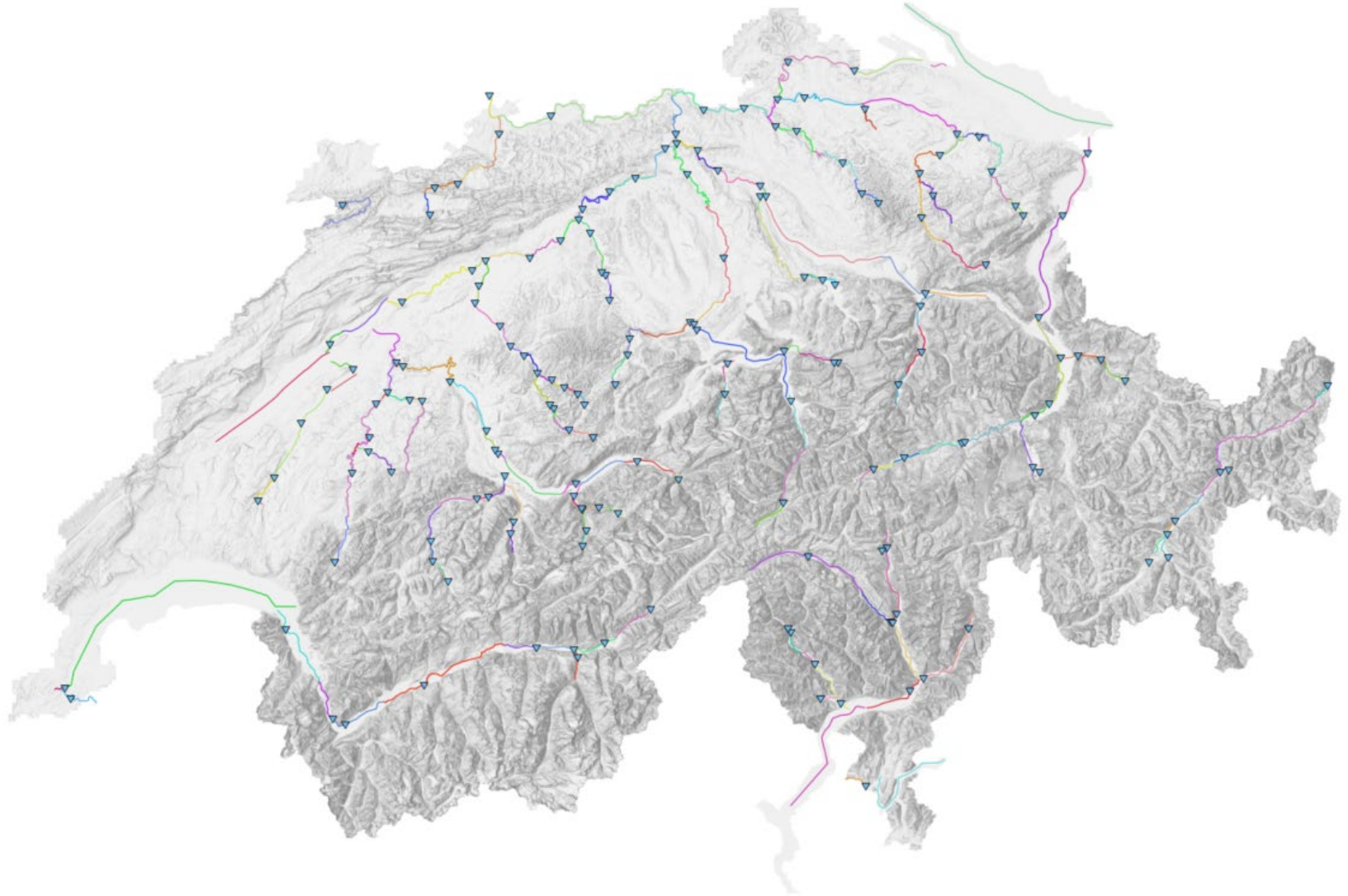
> **Elevation data:**

- swissALTI3D
 - Cantonal DEMs of AG, SO, ZH, BE, ZG, LU, FOEN (Hochrhein), DTM AT (10m)
- > BASEplane

> **Exposure data:**

- swissTLM3D (building footprints, hospital and school area)
- Buildings and dwellings statistic (Federal Statistics Office)
- Statistik der Unternehmensstruktur (STATENT, Federal Statistics Office)
- Kennzahlen der Schweizer Pflegeheime (Federal Office of Public Health)

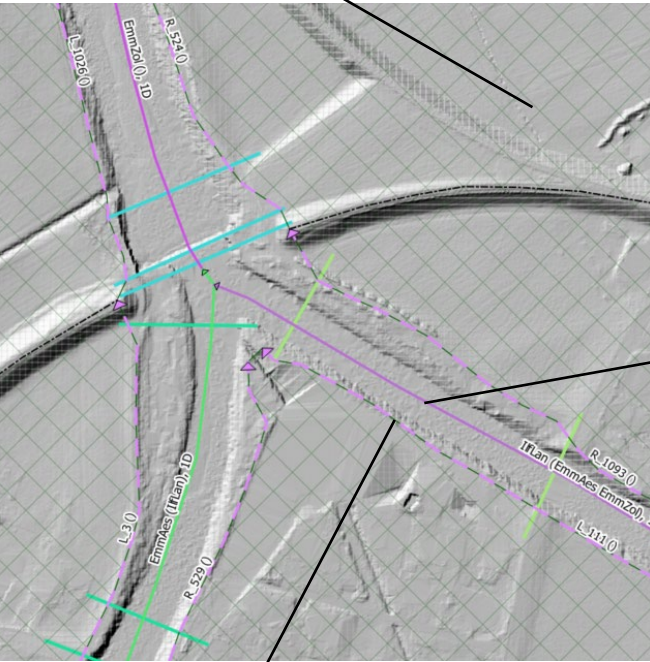
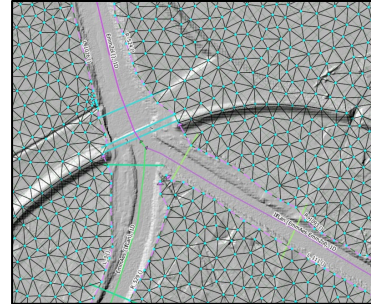
Study area



Preprocessing

gid	2166
type	river
modified	2022-01-14T15:20:41
mod_by	mmosimann
use_bl	t
meshed	2022-01-14T15:28:25
surrogates	{IfLan,EmmZol}

BASEmesh 1.4.2
(max 200 m²)



gid	388
river	Emme
subdomain	1D
surrogate	EmmAes
boundaries	IfLan
ds_zhyd_num	NULL
storyline	EmmZol
weir_from_dyke1d	f
internal levees	t
kst_riverbed	27
kst_embankment	27
calib_station	2409
max_coupling_dist	-1
init_flowdepth	1.00
date_surrogate	2022-01-16T14:20:10
date_storyline	2022-02-02T13:47:38
remarks	
modified	2022-01-14T16:26:04
mod_by	mmosimann
surrogate_man	f
storyline_man	f
ds_zhyd	
us_zhyd	
validated	t
cs_to_ignore	

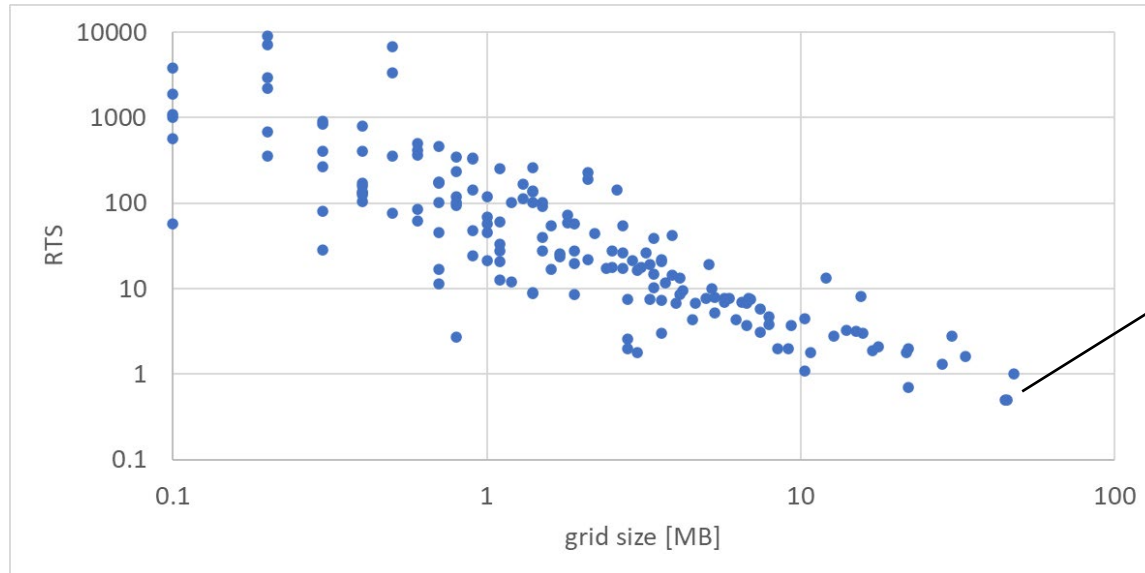
id	111
fluss	
floodplain	
seite	L
stringdef	L_111
wse	NULL
weir_from_dyke1d	f

```

    }}
  }}
  BOUNDARY {{
    string = upstream
    type = {us_type}
    slope = {cs_Qout.slope.loc[0]}
    file = {us_type}_{riv}.txt
  }}
  BOUNDARY {{
    string = downstream
    type = {d.ds_boundary}
  }}
  FRICTION {{
    type = strickler
    default_friction = 33
  }}
  INITIAL {{
    type = backwater
    q_out = {cs_Qout.q.loc[0]}
    WSE_out = {cs_Qout.wse.loc[0]}
  }}
  {d.inner_boundaries}
}}
OUTPUT {{
  output_time_step = {d.output_ts}
  console_time_step = {d.output_ts}
}}

```

Modelling performance (two threads each)



~ 45 MB
~ 650k els
~ 80 km²

- > Upload of simulation outputs to PostgreSQL-db (flowdepth & velocity in 1h-timesteps)
-> flow depth and velocity are turned into “*hazard classes*”
- > Exposure analysis (PostGIS), loss estimation (Python), aggregation to subregions (PostgreSQL)
- > Rasterization of els to TIF (pyQGIS) -> to PNG (Python) -> to WebM (FFmpeg)
- > Road network analysis (Python → Igraph)

