Research meets practice:
the power lies in necessity

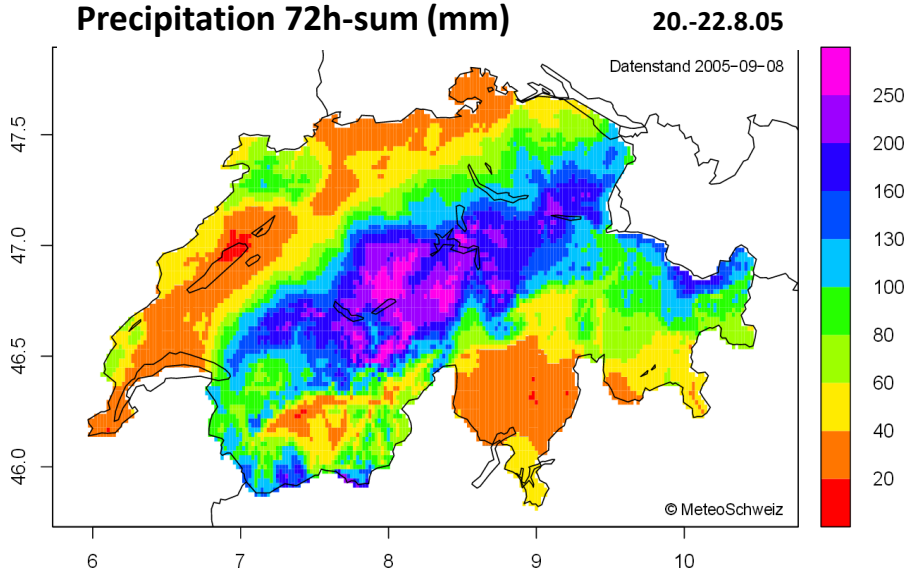
Käthi Liechti and Massimiliano Zappa

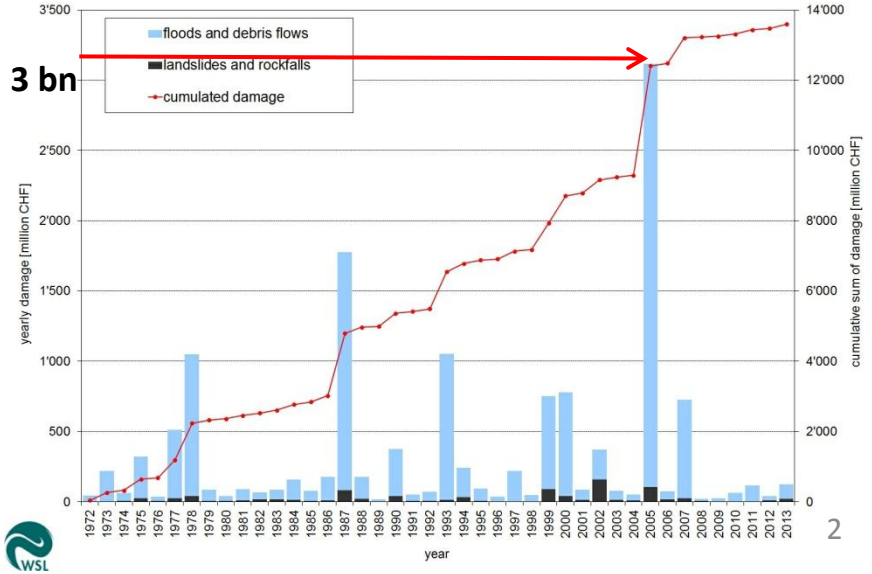
Swiss Federal Institute for Forest, Snow and Landscape Research WSL

Swiss Federal Institute for Forest,
Snow and Landscape Research WSL

Tenth Anniversary Workshop

Start: Flooding in 2005

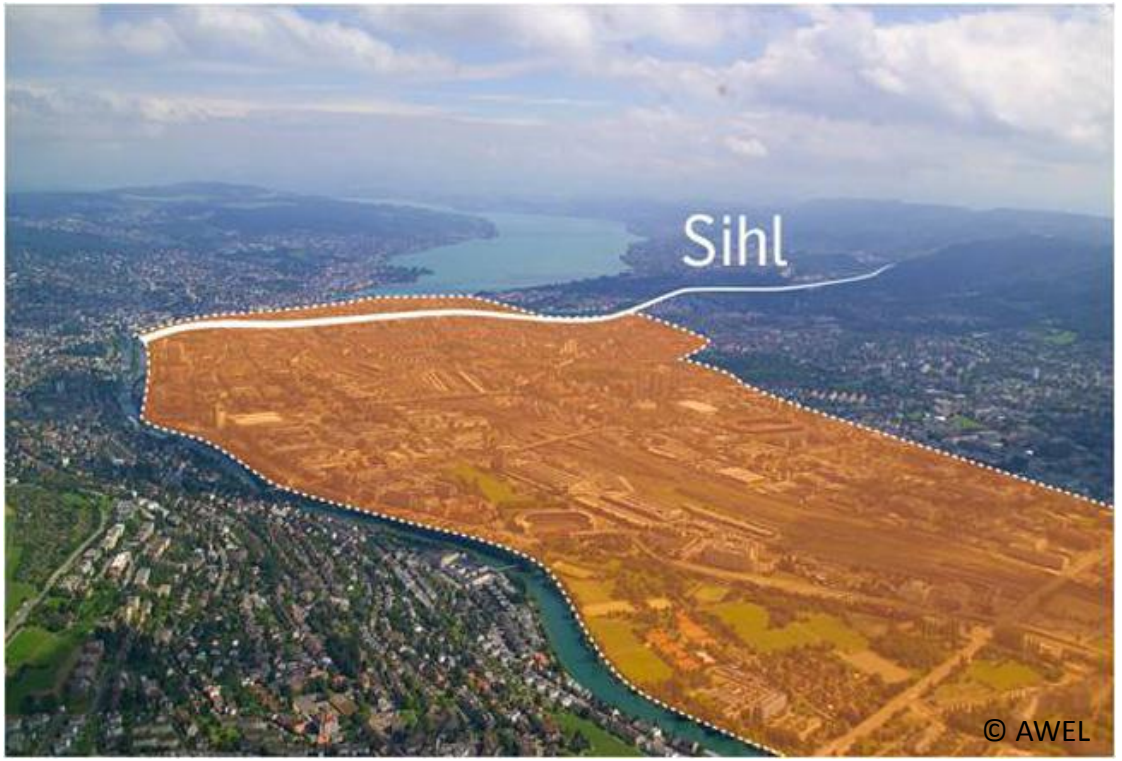




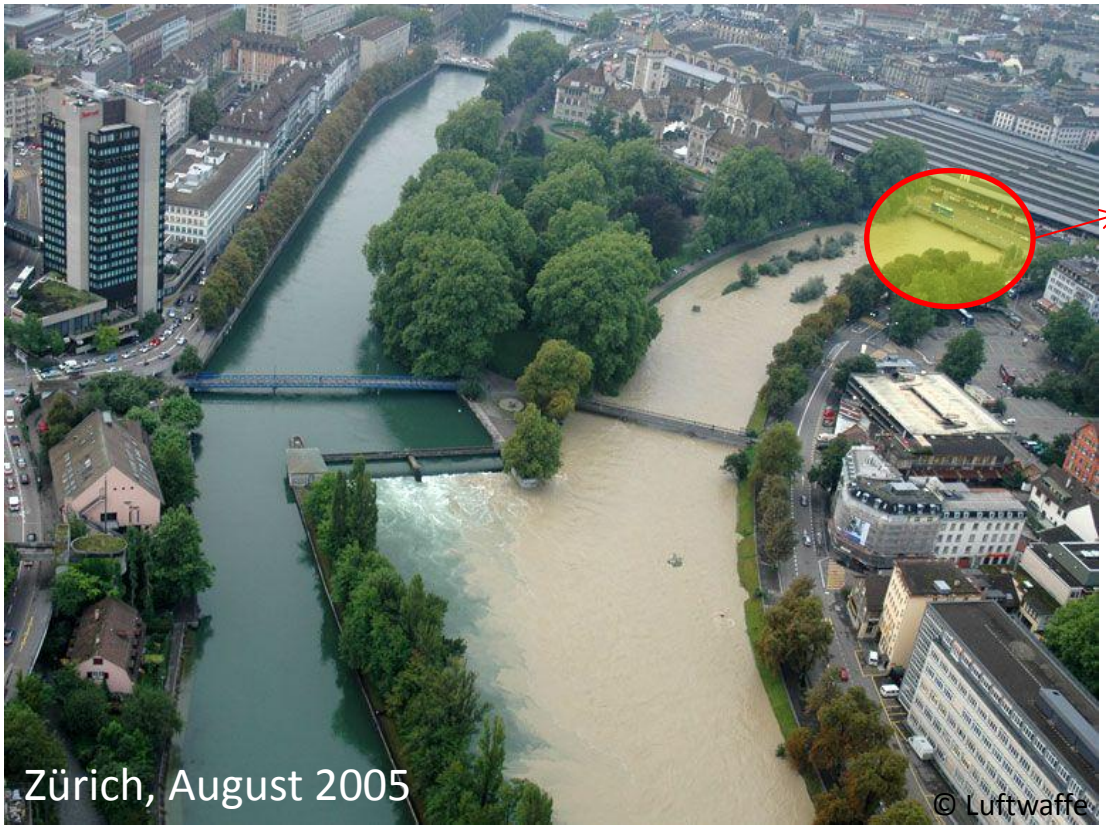
Zürich damage potential

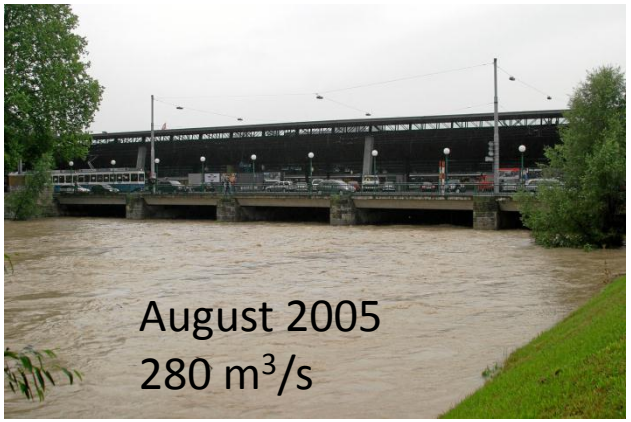
- Infrastructure on alluvial fan
- Possible damages of 5 billions CHF

- Extreme runoff estimation (Schwanbeck et al., 2007)
- Runoff peaks of 360 – 480 m^3/s

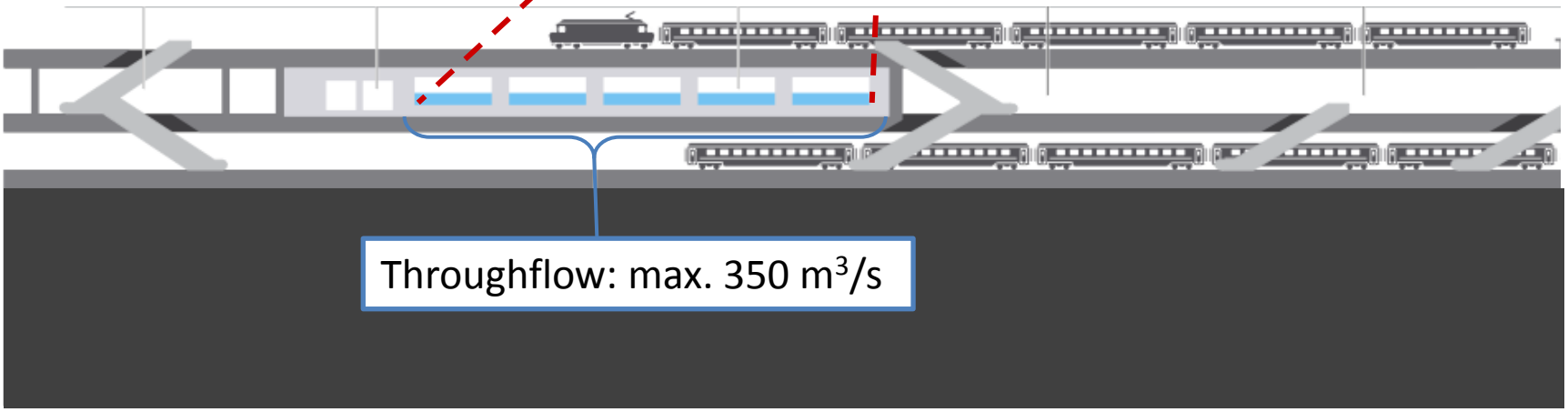


Bottleneck – the railway station



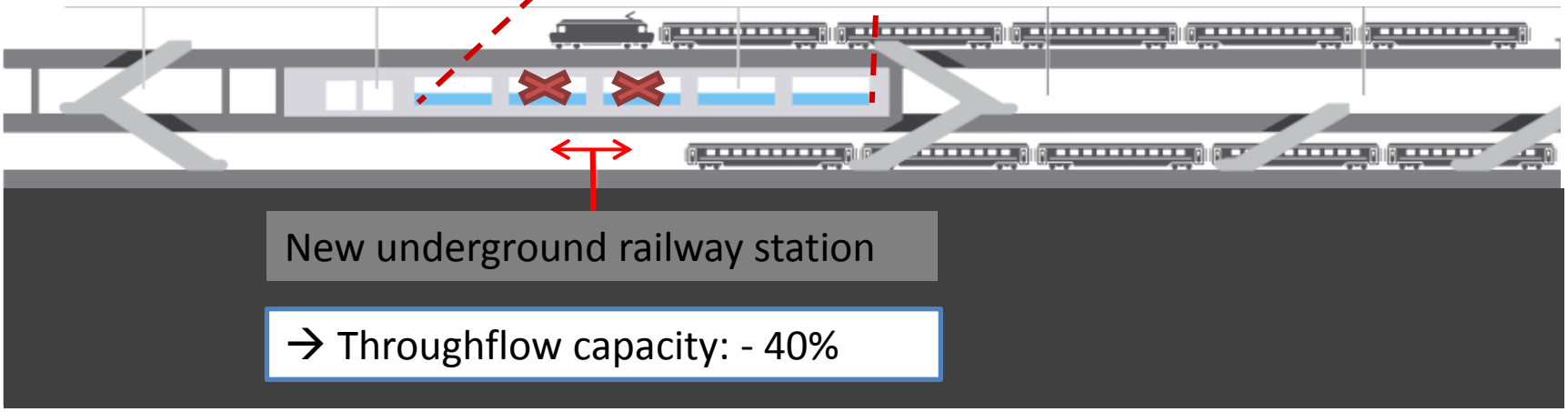


Bottleneck – railway station



cross section, railway and river

Bottleneck – railway station



cross section, railway and river

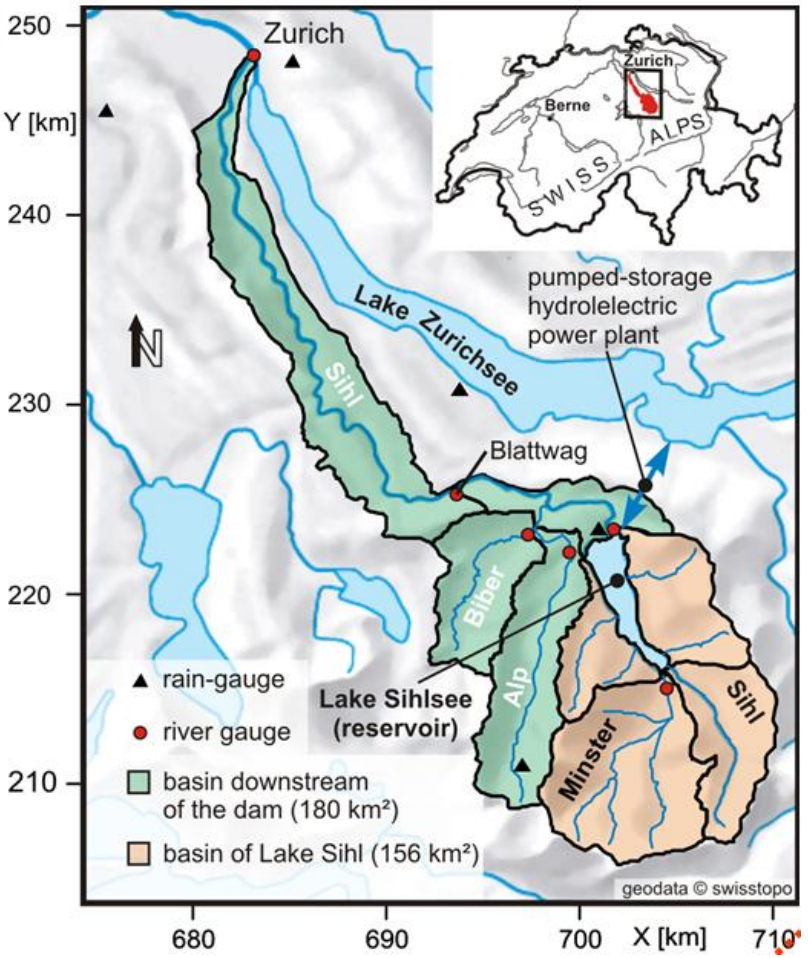
Sihl catchment

Area: 336 km^2

Reservoir lake devides catchment in 2 parts

Used for hydropower production for the railway company

Retention basin for ~46% of the catchment



Models

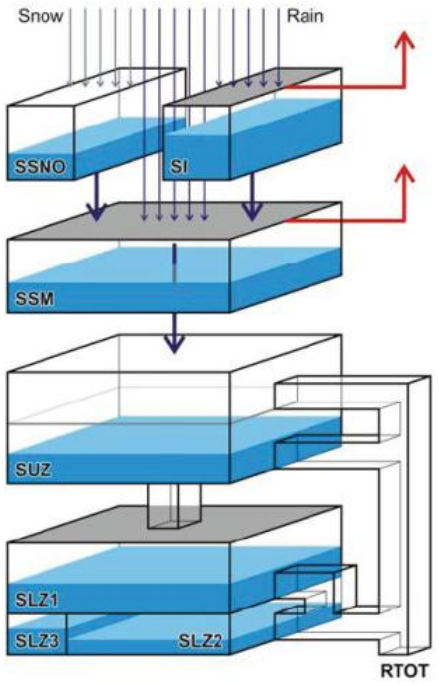
NWP:

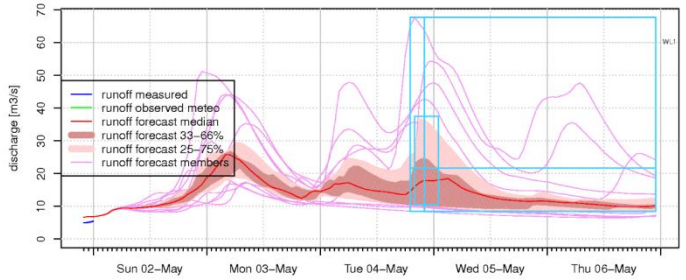
COSMO-LEPS	COSMO-7	COSMO-2
Lt: 5 days 16 members X ~ 7 km	Lt: 3 days X ~ 7 km	Lt: 1 day X ~ 2 km

Hydrological model:

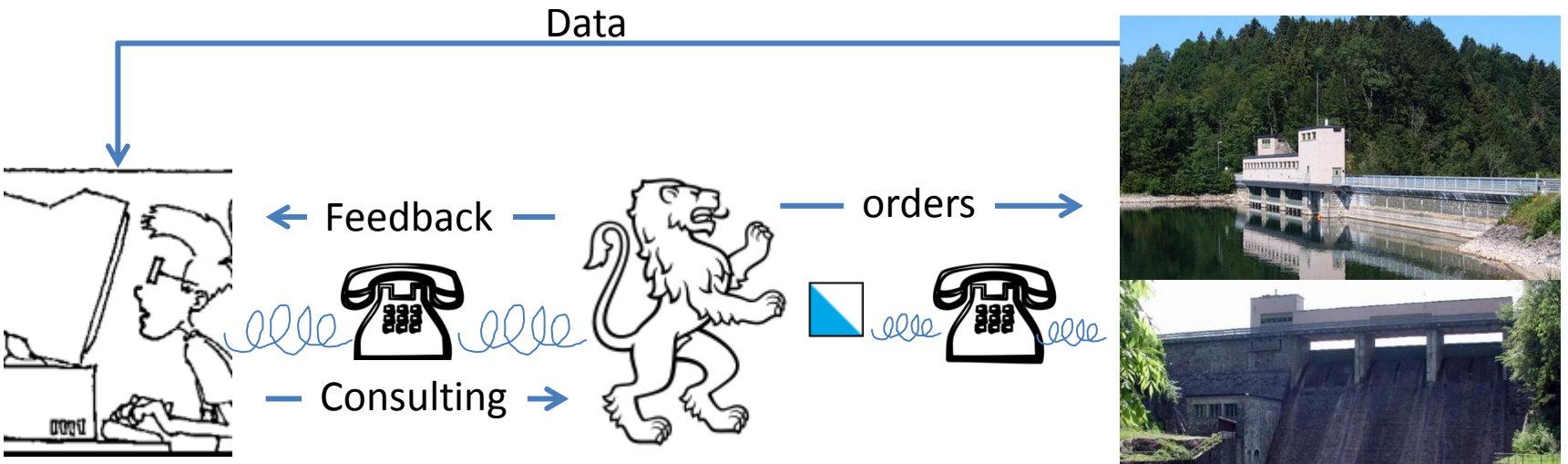
PREVAH

- Semi-distributed
- 500 m grid
- Hourly timesteps
- Air temperature, water vapour pressure, global radiation, wind speed, sunshine duration and precipitation





Stakeholders



Hydrologists

End user:
Canton Zürich
Office for Waste,
Water, Engergy and Air

Hydropowerplant

The platform

Event May 31 to June 2nd 2013

AWEL Informationsplattform Sihl

Minster, Euthal | Sihlsee, Inflow | Sihlsee, Level | Sihl, Schlagen | Alp, Einsiedeln | Biber, Biberbrugg | Sihl, Dreiwässern | Sihl, Blattwag | Sihl, Sihlwald | Sihl, Zürich

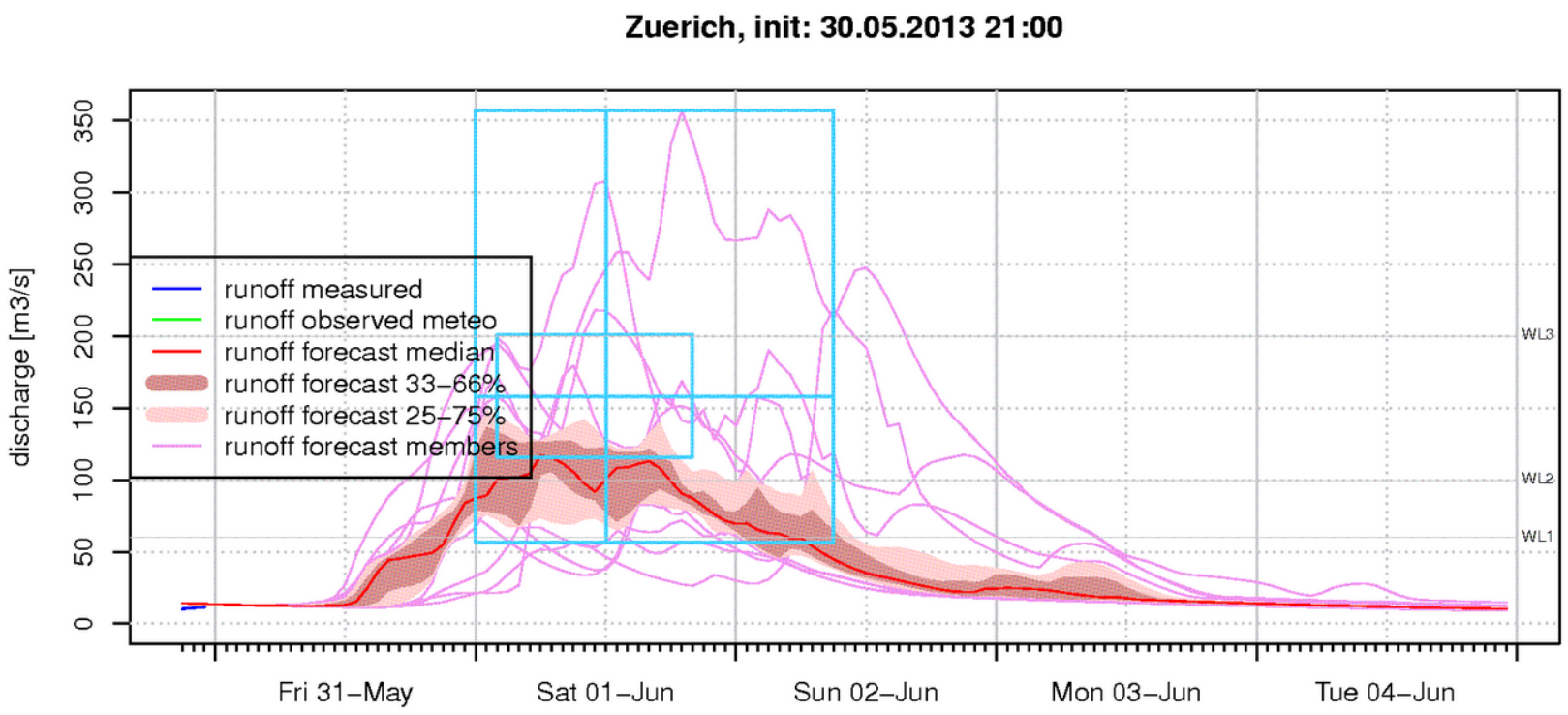
VORHERSAGEN
- COSMO-LEPS
- COSMO-7
- COSMO-2

WARNTABELLEN
METEOGRAMME
MANAGEMENT
NOWCAST
ABFLUSSMESSUNGEN
METEODATEN
RADARFILM
VORHERSAGE_BAFU
SCHNEEHYDROLOGIE
WEBCAM
LINKS
KONTAKT

Vorhersagen PREVAH/FLORIS-Modellsystem - Sihl, Zürich - Letzte Lagebeurteilung

Modellantrieb mit atmosphärischen Daten der MeteoSchweiz (COSMO-LEPS):

2013053021



The platform

Event May 31 to June 2nd 2013

AWEL Informationsplattform Sihl

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- COSMO-7
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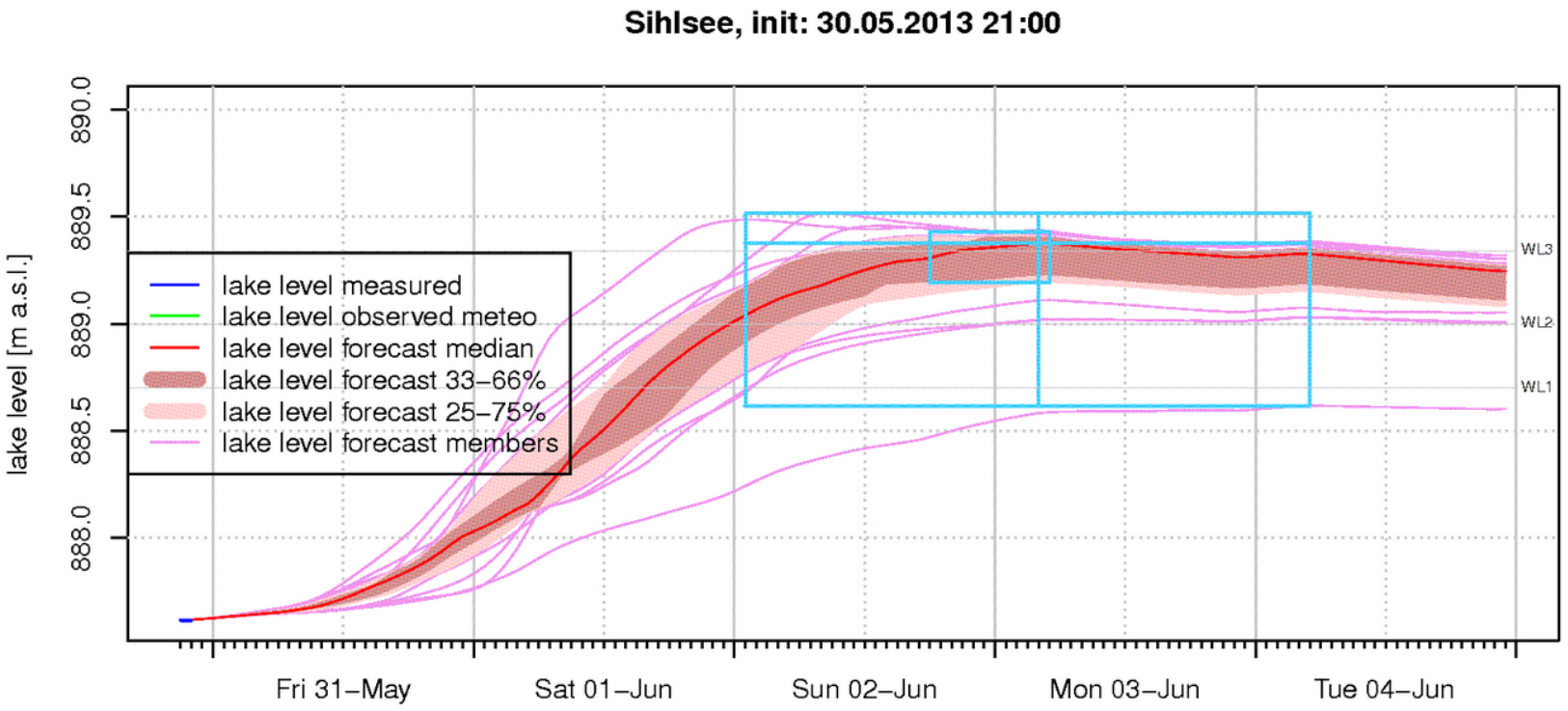
2013053021



COSMO-7

AWEL Informationsplattform Sihl

Minster, Euthal | Sihlsee, Inflow | Sihlsee, Level | Sihl, Schlagen | Alp, Einsiedeln | Biber, Biberbrugg | Sihl, Dreiwässern | Sihl, Blattwag | Sihl, Sihlwald | Sihl, Zürich

VORHERSAGEN
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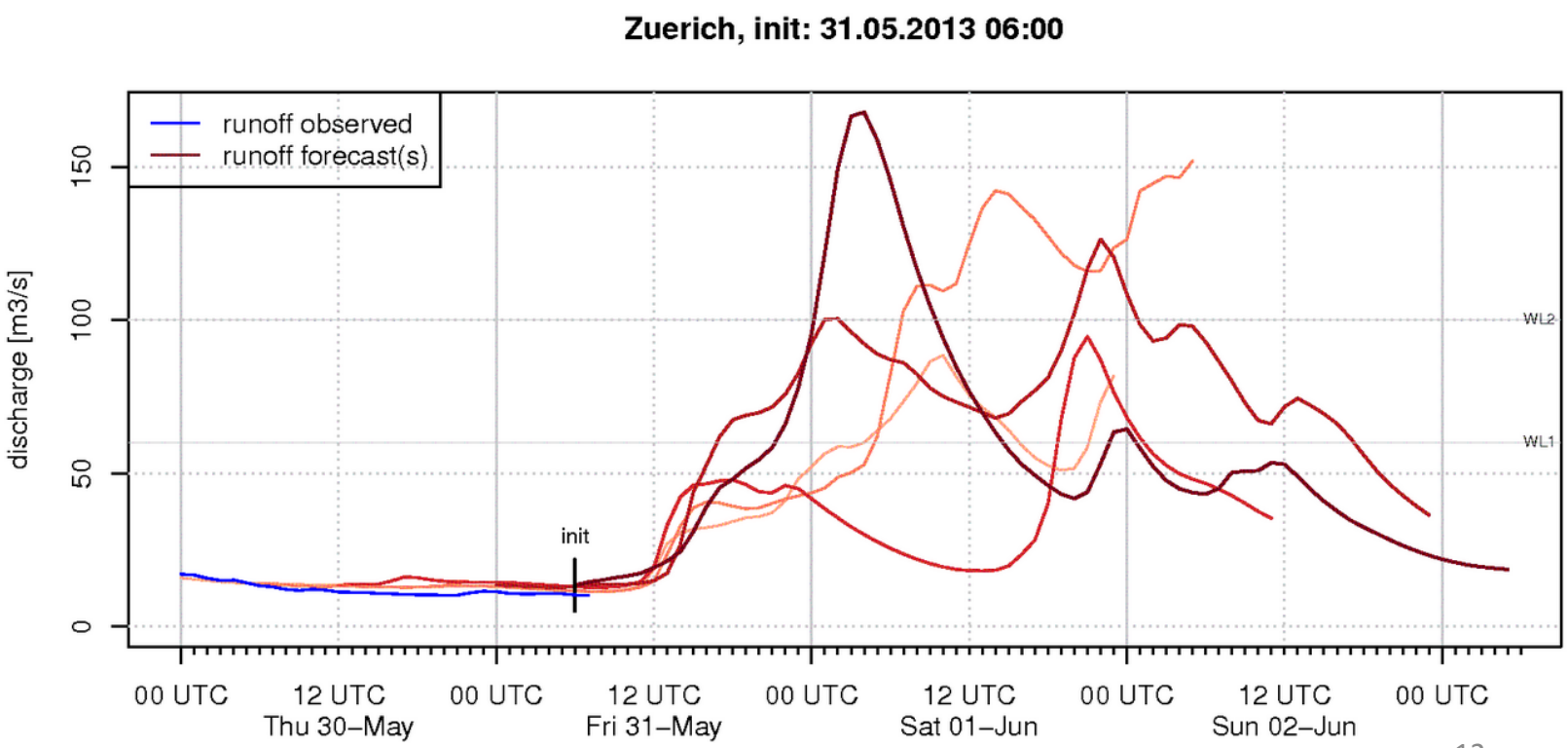
Vorhersagen PREVAH/FLORIS-Modellsystem - Sihl, Zürich - Letzte Lagebeurteilung

Modellantrieb mit atmosphärischen Daten der MeteoSchweiz (COSMO-7):

2013053106



COSMO-2

AWEL Informationsplattform Sihl

Minster, Euthal | Sihlsee, Inflow | Sihlsee, Level | Sihl, Schlagen | Alp, Einsiedeln | Biber, Biberbrugg | Sihl, Dreiwässern | Sihl, Blattwag | Sihl, Sihlwald | Sihl, Zürich

VORHERSAGEN
- COSMO-LEPS
- COSMO-7
- COSMO-2

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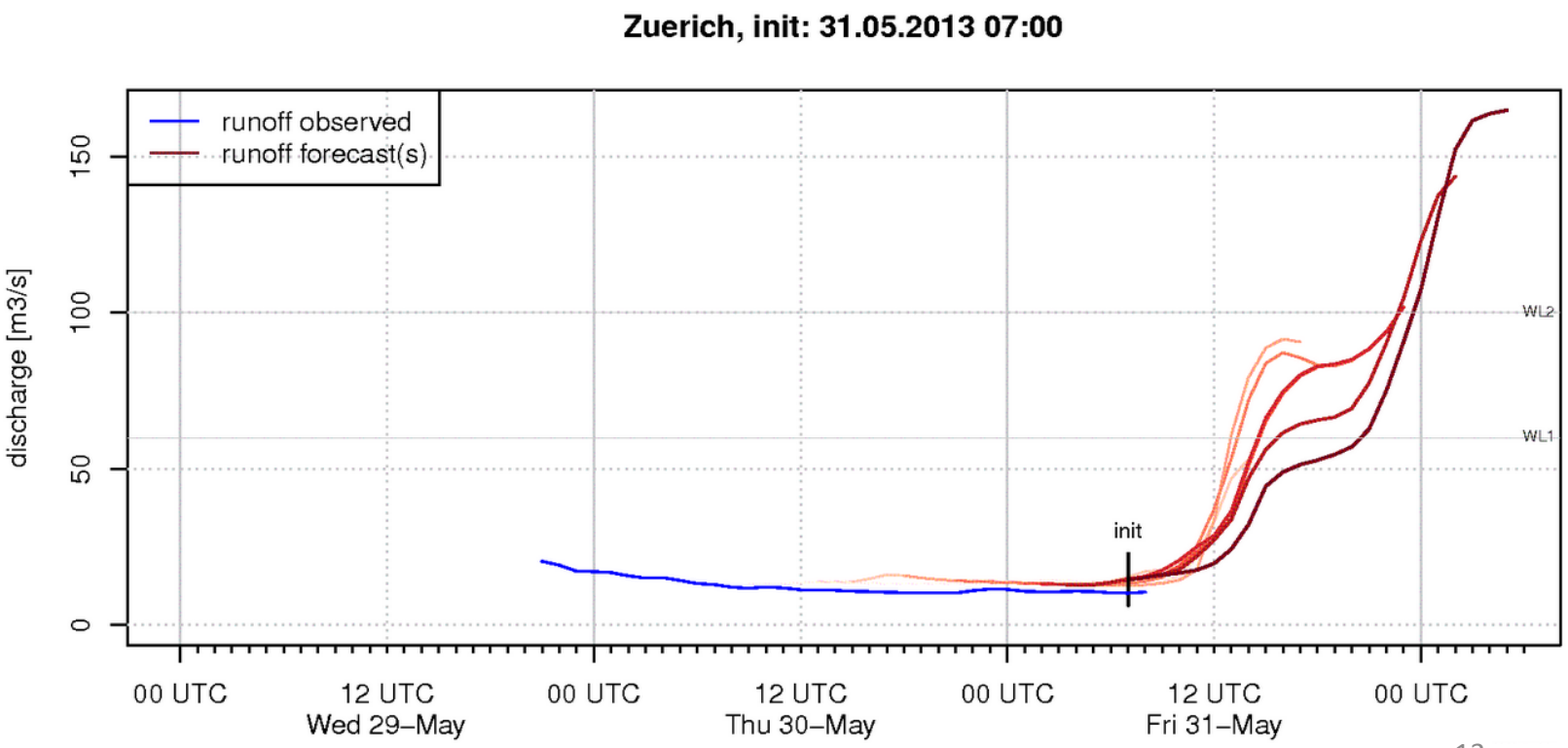
LINKS
KONTAKT

Vorhersagen PREVAH/FLORIS-Modellsystem - Sihl, Zürich - Letzte Lagebeurteilung

Modellantrieb mit atmosphärischen Daten der MeteoSchweiz (COSMO-2):

2013053107



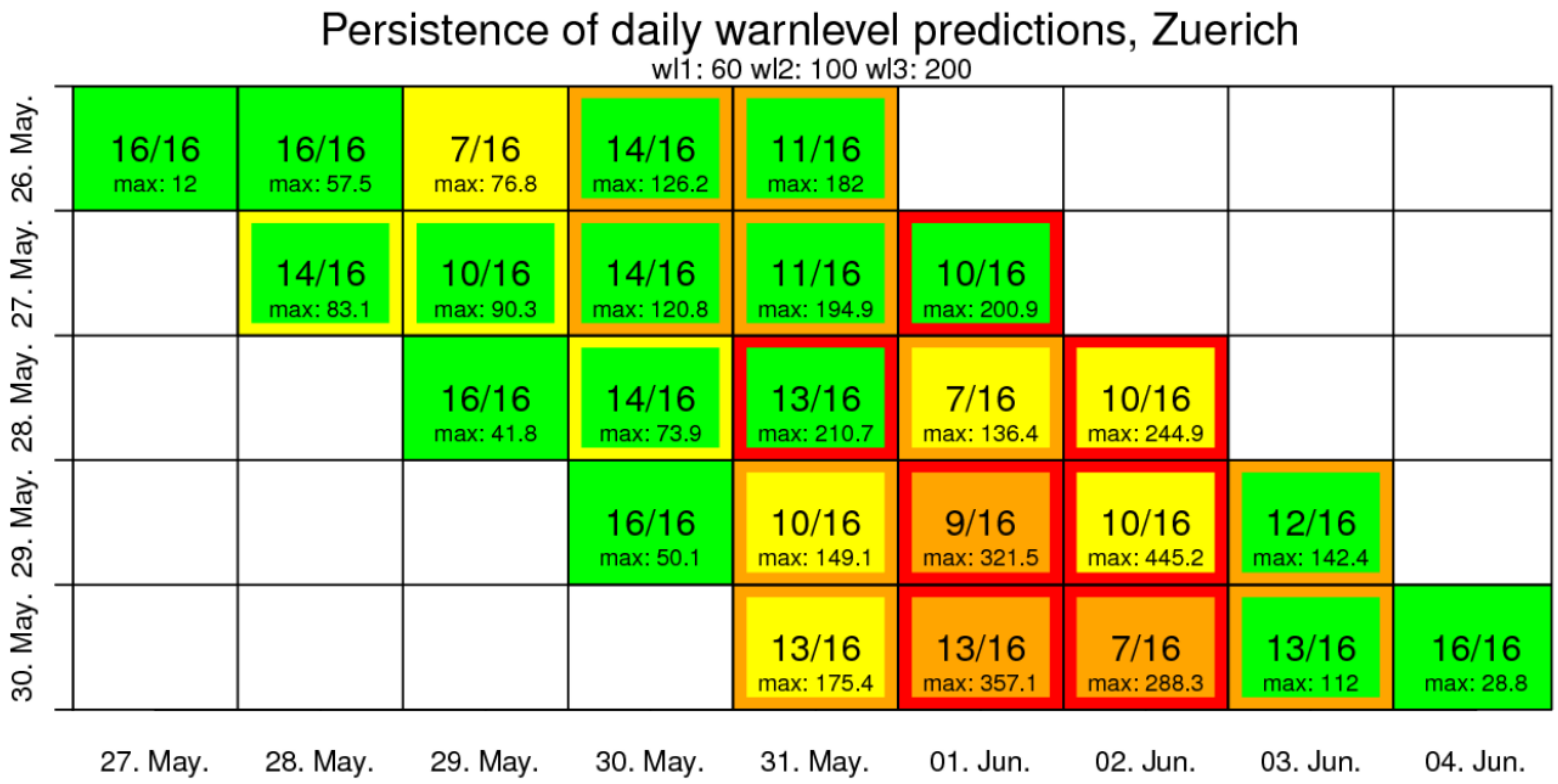
Warning table

AWEL Informationsplattform Sihl

Minster, Euthal | Sihlsee, Inflow | Sihlsee, Level | Sihl, Schlagen | Alp, Einsiedeln | Biber, Biberbrugg | Sihl, Dreiwässern | Sihl, Blattwag | Sihl, Sihlwald | Sihl, Zürich

- VORHERSAGEN
- WARNTABELLEN
- METEOGRAMME
- MANAGEMENT
- NOWCAST
- ABFLUSSMESSUNGEN
- METEODATEN
- RADARFILM
- VORHERSAGE_BAFU
- SCHNEEHYDROLOGIE
- WEBCAM
- LINKS
- KONTAKT

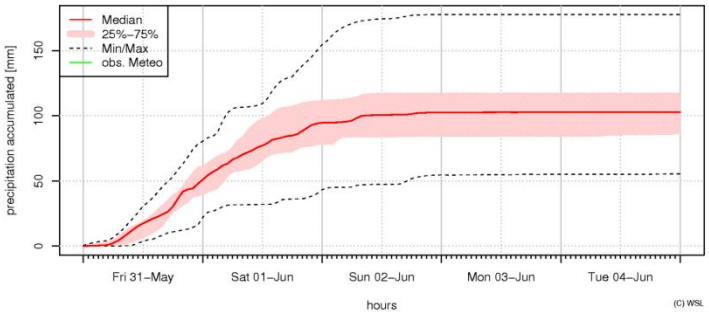
Warntabellen PREVAH/FLORIS-Modellsystem - Sihl, Zürich - Letzte Lagebeurteilung



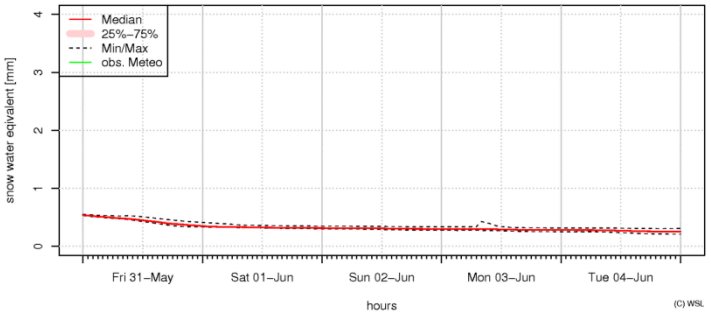
Meteograms

- VORHERSAGEN
- WARNTABELLEN
- METEOGRAMME
  - Niederschlag
    - Schnee
    - Bodensättigung
- MANAGEMENT
- NOWCAST
- ABFLUSSMESSUNGEN
- METEODATEN
- RADARFILM
- VORHERSAGE_BAFU
- SCHNEEHYDROLOGIE
- WEBCAM
- LINKS
- KONTAKT

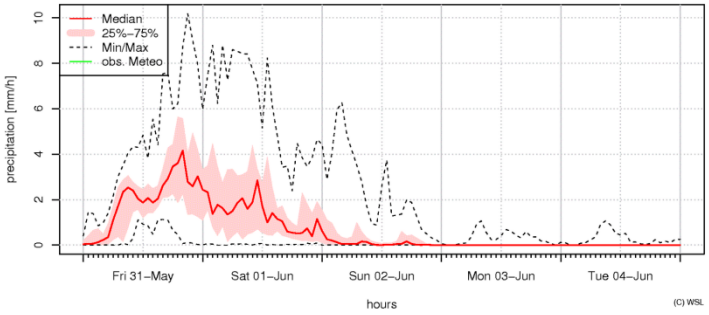
Acc. Precipitation



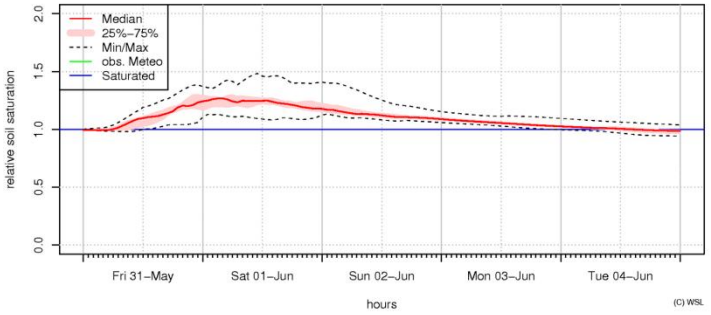
Snow water equivalent



Precipitation



Relative soil saturation



Management Tool

- VORHERSAGEN
- WARNTABELLEN
- METEOGRAMME
- MANAGEMENT
  - COSMO-LEPS Scenarios
    - COSMO-LEPS Graphs
    - COSMO-7 Scenarios
    - COSMO-7 Graphs
    - COSMO-2 Scenarios
    - COSMO-2 Graphs
    - Abschätzung Sihlabfluss
- NOWCAST
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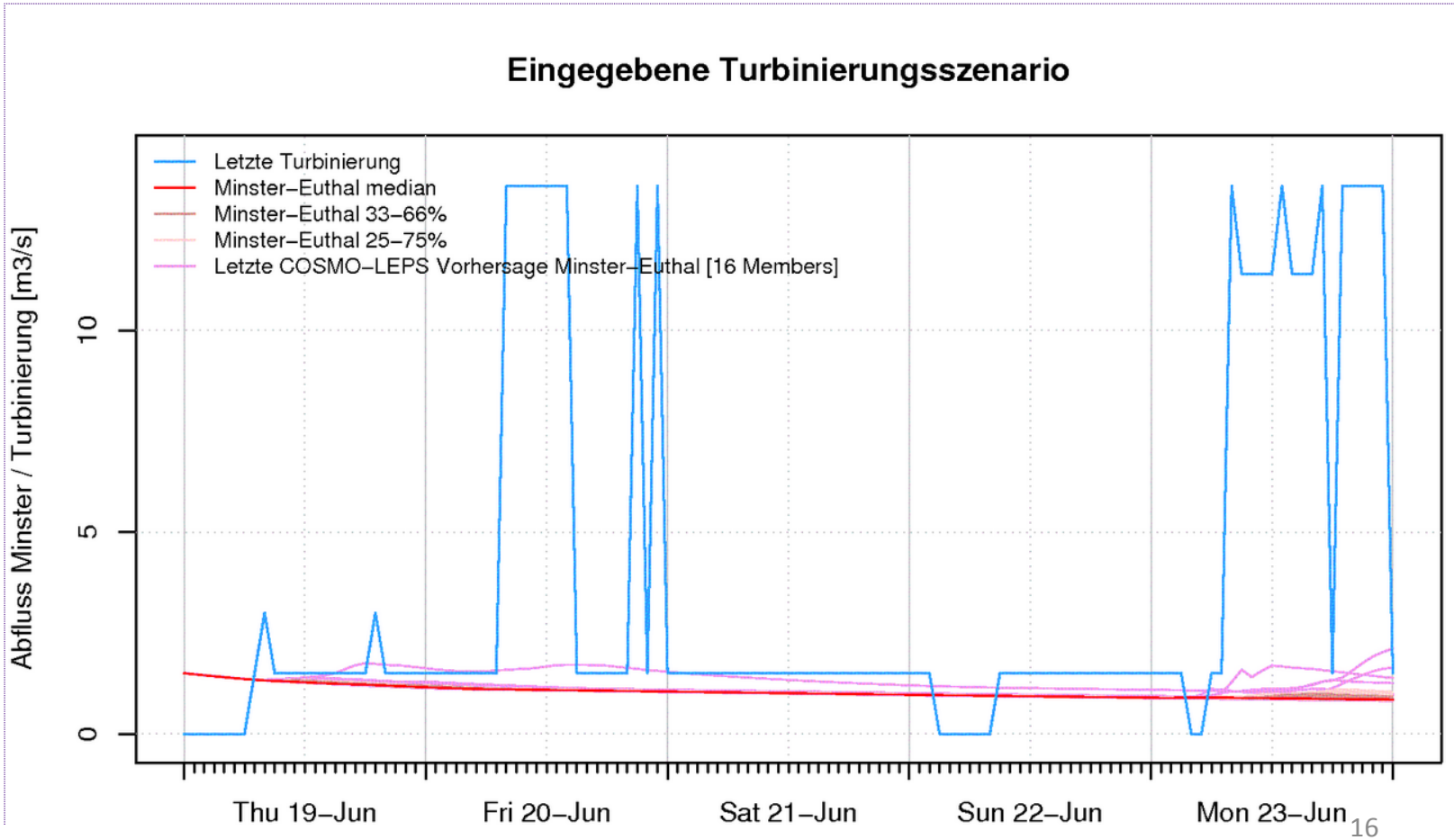
- METEODATEN
- RADARFILM
- VORHERSAGE_BAFU
- SCHNEEHYDROLOGIE
- WEBCAM

COSMO-LEPS SCENARIOS - Dokumentation

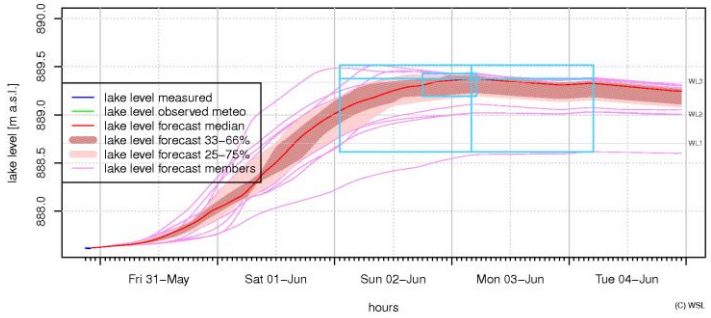
Time-Step	Turbinierung [m3/s]	Vorabsenkung [m3/s]	Zufluss-Sihlsee [-]	Alp-Biber [-]
2014-06-19-00	0.0	0.0	1.0	1.0
2014-06-24-00	0.0	0.0	1.0	1.0

Add Time-Step | Plot | Submit Values

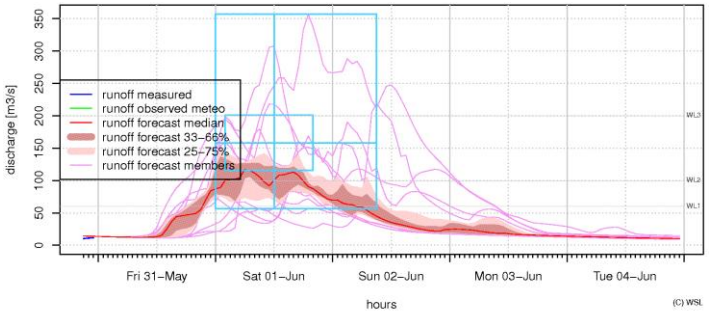


Forecast May 31st

Lake will be full



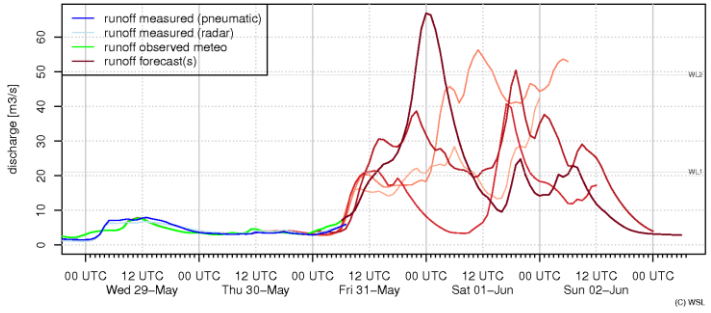
High discharge in Zürich



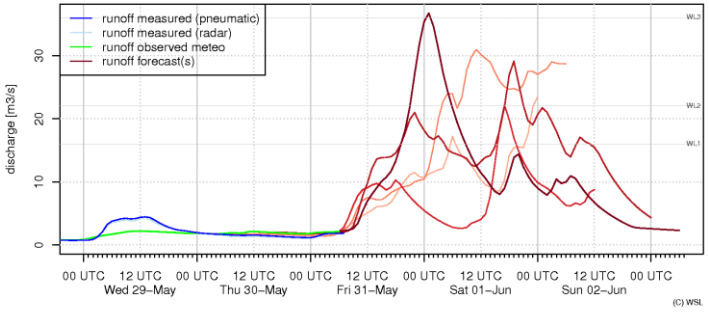
End user decides: drawdown of the lake by 80 m^3/s from Friday morning to Saturday evening

Hydrologists: don‘t like the idea, as drawdown overlaps with peaks of tributaries

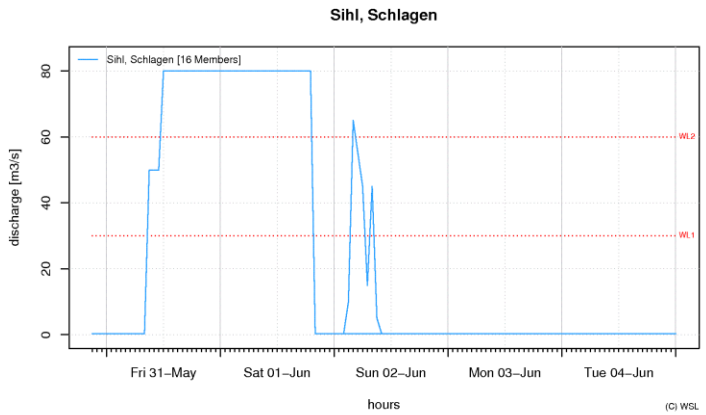
Alp: 31.05.2013 9:00

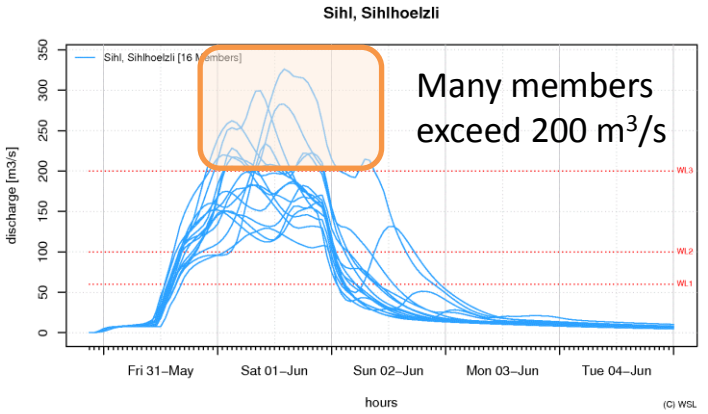


Biber: 31.05.2013 9:00

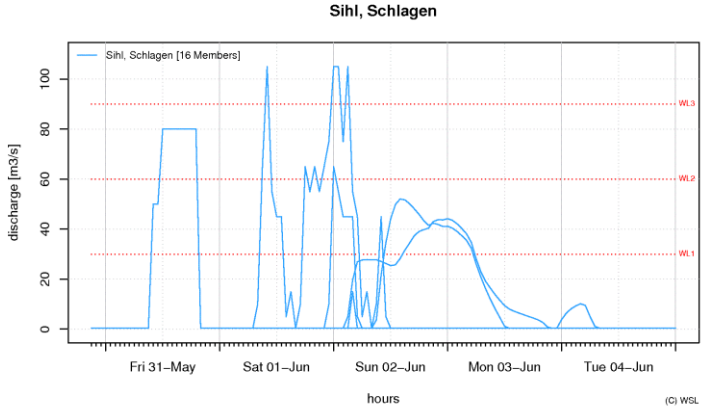


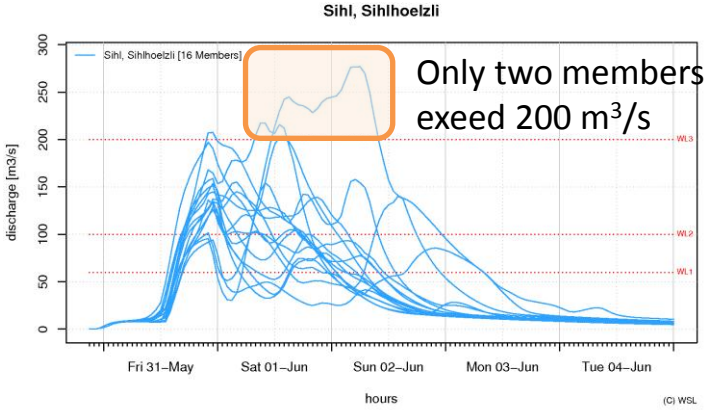
Scenario 1 by end user:





Scenario 2 by hydrologists:

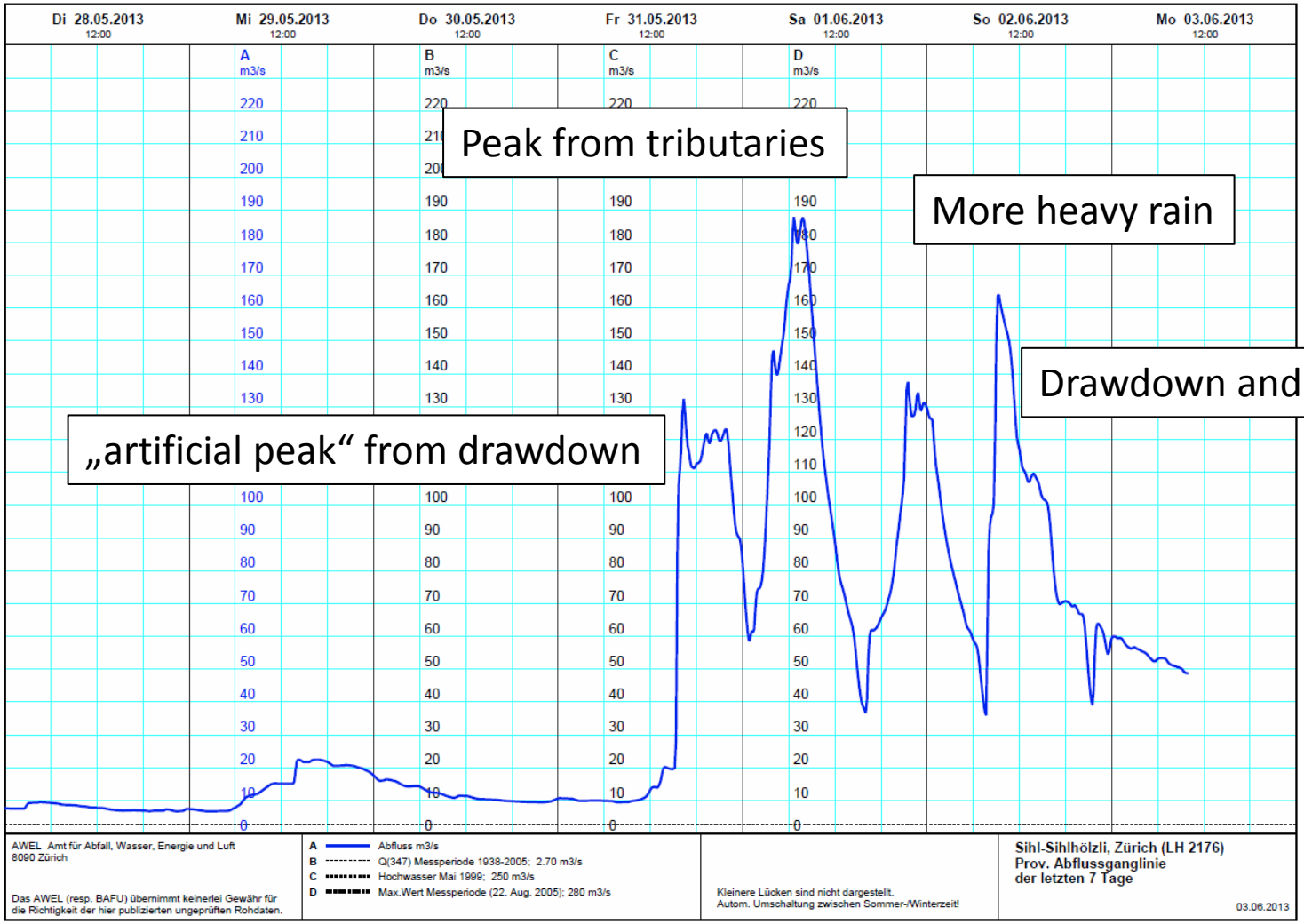




Stop drawdown on Friday night and let the peaks of the tributaries pass.
Reduce the probability of exceending warnlevel 3 in Zürich.

The result

Discharge in Zürich May 28 – June 3rd



The result

Sat. June 1st 2013, 9 am, 150 m^3/s

Research meets practice:

the power lies in necessity

- Flood 2005: public awareness, money for research and prevention
- Zürich: timely and solid solution for flood forecasting needed

  (in particular during construction of underground station)
- + Enthusiastic scientists and endusers who like to run and use an operational flood forecasting system.

Swiss Federal Institute for Forest,
Snow and Landscape Research WSL

By the way …

…. the new railway station was opend 10 days ago!