

MARSEILLE
DU 27 MAI
AU 3 JUIN
2022



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27TH CONGRESS
90TH ANNUAL
MEETING



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BYPASSING AND SEDIMENT TRANSFER WORKSHOP
Saturday, May 28, 2022, 08:00-10:00

Operational aspects

Andrea Baumer
Maggia Powerplants (OFIMA) - Switzerland



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Importance of a proper plant management with bypass tunnel:

- Diverting the flow in the right moment, to optimise the separation of sediments from water
- Have enough time to gradually increase the downstream flow for security reasons
- To best simulate a natural flood, with normally the solid transport occurring in the increasing flow phase.

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The necessity for a timely opening is mostly relevant for medium to big reservoirs and less for small reservoirs, but it depends on the inflow increase rate, the available volume in the reservoir and the power plants configuration: where the SBT is located or where the power house is (directly downstream of the dam or offstream).

Normally 3-5 days in advance with reliable forecasts are useful to prepare the diversion with operators ready for on-call duty, and 2-3 hours to activate the operators if the event is confirmed.

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Small reservoirs:

In the case of a small reservoir or reservoirs with the powerhouse releasing just downstream, the upstream and downstream flows are quite similar, so the diversion doesn't influence the latter and fast openings are mostly practiced. In these cases a gauging station upstream is not so important, as the measurements at the dam site are enough to ensure a correct diversion.

For the cases the powerhouse is far away (release of the water in a separate river or far downstream), the two flows, upstream and downstream of the dam, could be very different, but for small reservoirs the overtopping starts early at the beginning of the flood.

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Medium to big reservoirs

In these cases it is important to foresee the incoming flood to «prepare» the reservoir and the opening of the SBT.

Possible actions needed:

- Lowering of the water level that requires several hours or even days
- Gradual increase of the downstream flow with the opening of the SBT, for safety reasons giving enough time to evacuate the river or for ecological reasons letting the aquatic life react and move to safe places.
- For hydroelectric plants that require a production adaptation, a forewarning is important, to minimise the energy loss or compensate it with other plants.

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Operational aspects for medium-large reservoirs:

- Good weather forecasts are important for organising the operators 3-5 days in advance.
- Gauging stations upstream are important to follow the real-time flood evolution. Could be interesting to measure the turbidity for a good diversion timing.
- An opening plan must be defined in advance, to avoid security problems downstream (opening steps if necessary over hours); limited maximum opening to avoid amplification of the inflow peak caused by exiting of reservoir volume through the SBT (normally just over the inflow).
- Remote controlled and operated is possible, but often the presence on site is necessary for a better surveillance and reaction.

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Opening of the gate:

- With good forecasts, the beginning of the diversion could be anticipated, just to match the total opening with the arrival of the solid transport. If these forecasts are not reliable, it could bring to storage loss in case of «false alarms» or a late reaction and consequent sediment inflow in the reservoir
- For each reservoir, the sediment has a cost (removal cost once settled), that determines the concentration limit for the diversion decision. During a flood, the solid transport occurs with the flow increase, so it is important to reach this phase with the correlated opening of the gate. In case of an expected overtopping, there are no economic losses.

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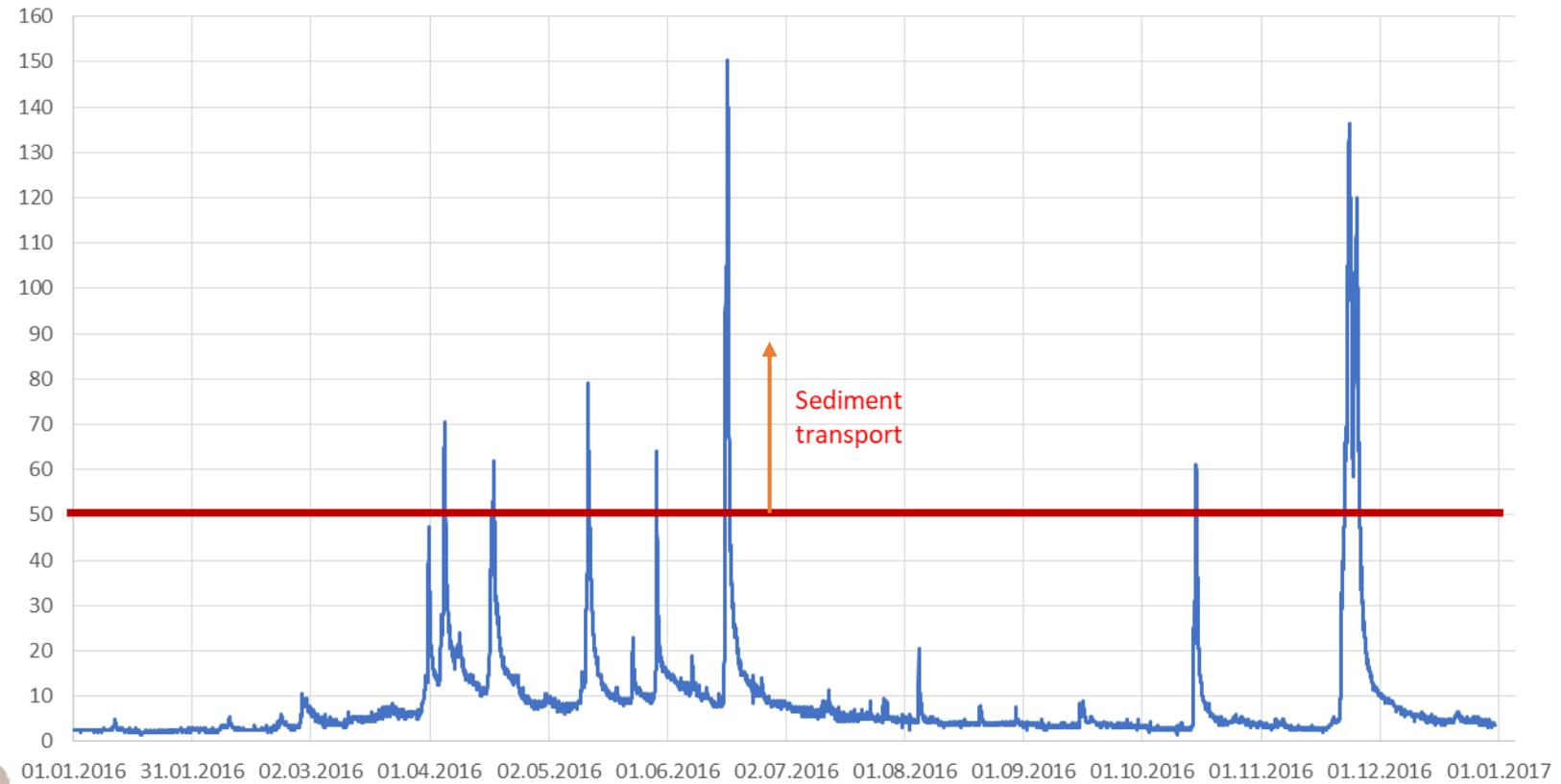
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Palagnedra case study



Melezza 2016



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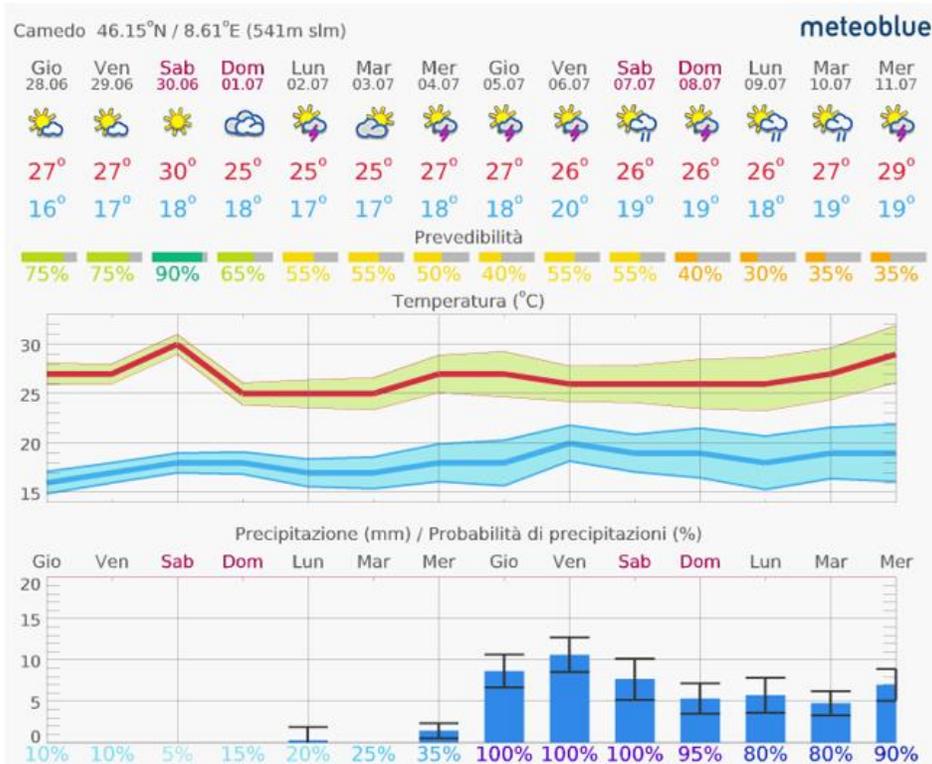
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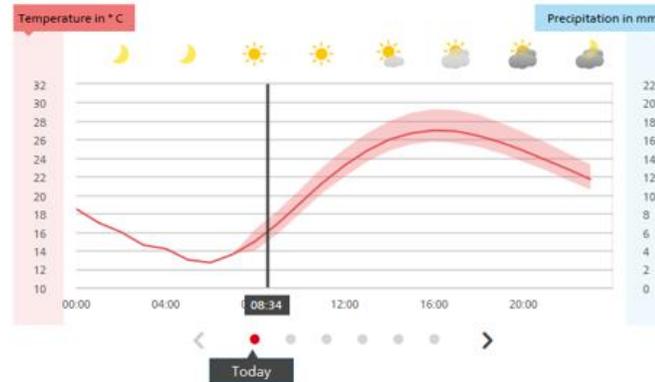
• Meteorological forecasts



Forecast last updated: 28.06.2018, 08:03

Local forecasts
Camedo

Today, 28 June 2018



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Dipartimento federale dell'interno DFI
Ufficio federale di meteorologia e climatologia

Previsioni quantitative di precipitazioni (OFIMA) 18 Maggio 2022

Alta Vallemaggia	Giovedì 19.05.2022		Venerdì 20.05.2022		Sabato 21.05.2022	Domenica 22.05.2022	Lunedì 23.05.2022
	00-12	12-24	00-12	12-24	00-24	00-24	00-12
Prec. Media	0	2	0	0	0	0	0
Prec. Min	0	0	0	0	0	0	0
Prec. Max	0	7	0	2	0	0	1
Isoterma 0 gradi	3800		4000		3800	3900	4000
Limite nevicate	3300	3400	3400	3500	3300	3300	3300
Affidabilità	9		9		8	7	6

Bassa Vallemaggia e Locarnese	Giovedì 19.05.2022		Venerdì 20.05.2022		Sabato 21.05.2022	Domenica 22.05.2022	Lunedì 23.05.2022
	00-12	12-24	00-12	12-24	00-24	00-24	00-12
Prec. Media	0	0	0	0	0	0	1
Prec. Min	0	0	0	0	0	0	1
Prec. Max	0	1	0	1	0	0	1
Isoterma 0 gradi	3800		4000		3800	3900	4000
Limite nevicate	3300	3300	3400	3500	3300	3300	3300
Affidabilità	9		9		8	7	6

Blenio	Giovedì 19.05.2022		Venerdì 20.05.2022		Sabato 21.05.2022	Domenica 22.05.2022	Lunedì 23.05.2022
	00-12	12-24	00-12	12-24	00-24	00-24	00-12
Prec. Media	0	0	0	1	0	0	0
Prec. Min	0	0	0	0	0	0	0
Prec. Max	0	3	0	4	0	0	1
Isoterma 0 gradi	3800		4000		3800	3900	4000
Limite nevicate	3400	3400	3400	3600	3300	3300	3300
Affidabilità	9		9		8	7	6

Pericoli:
Nessun pericolo meteorologico di rilievo.

Osservazioni:
Generalmente soleggiato e molto caldo per la stagione. Nel corso della giornata sviluppo di cumuli e in serata, soprattutto nelle Alpi, rovesci o temporali isolati. Sabato e domenica temporaneamente più asciutto. Lunedì pomeriggio possibilità di temporali più estesi.

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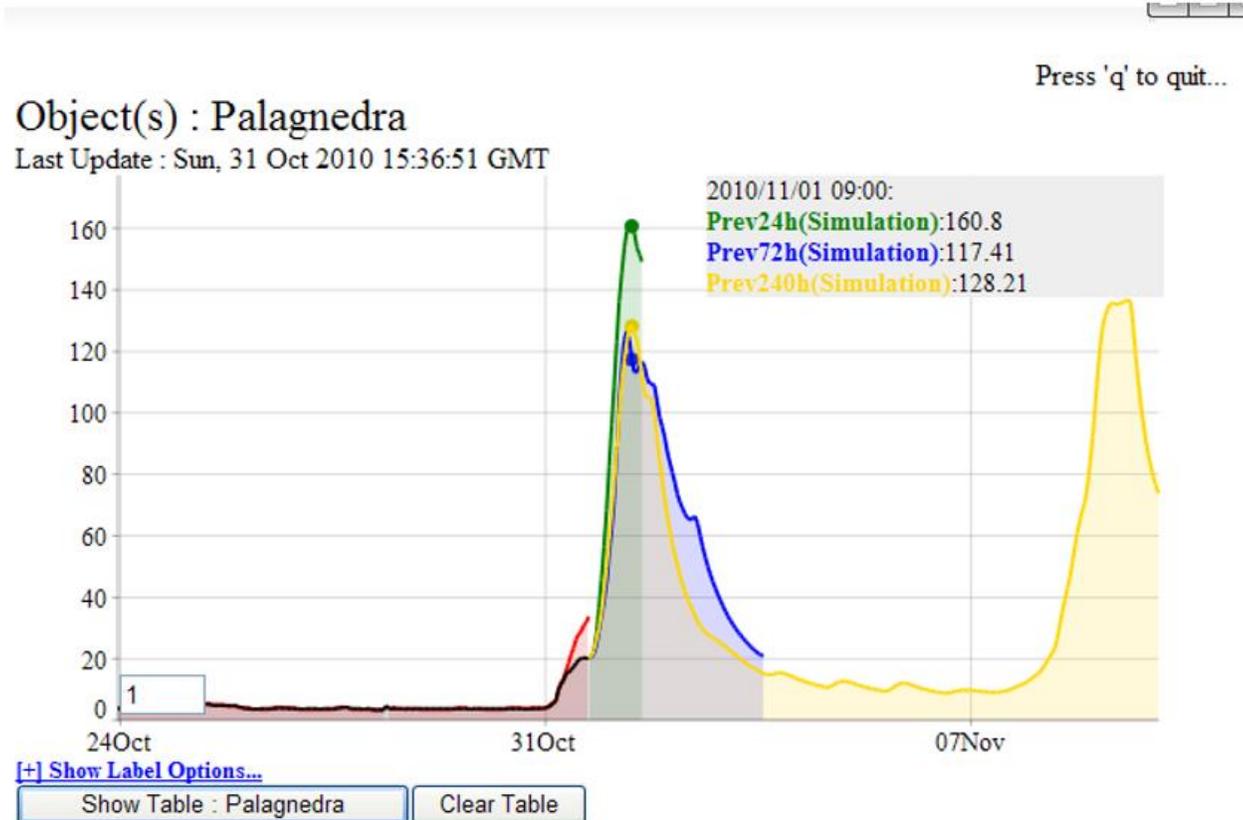
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- Runoff prediction



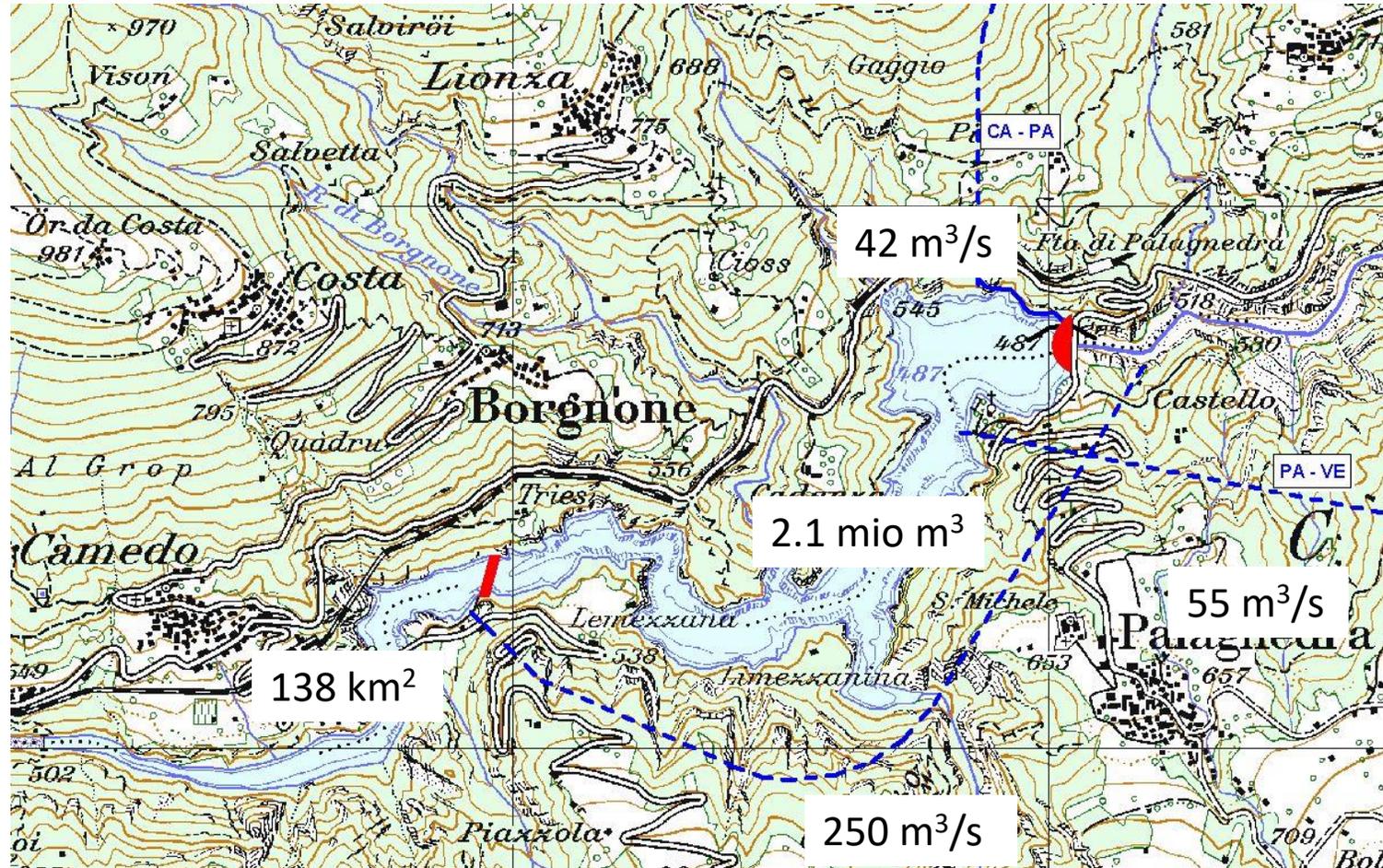
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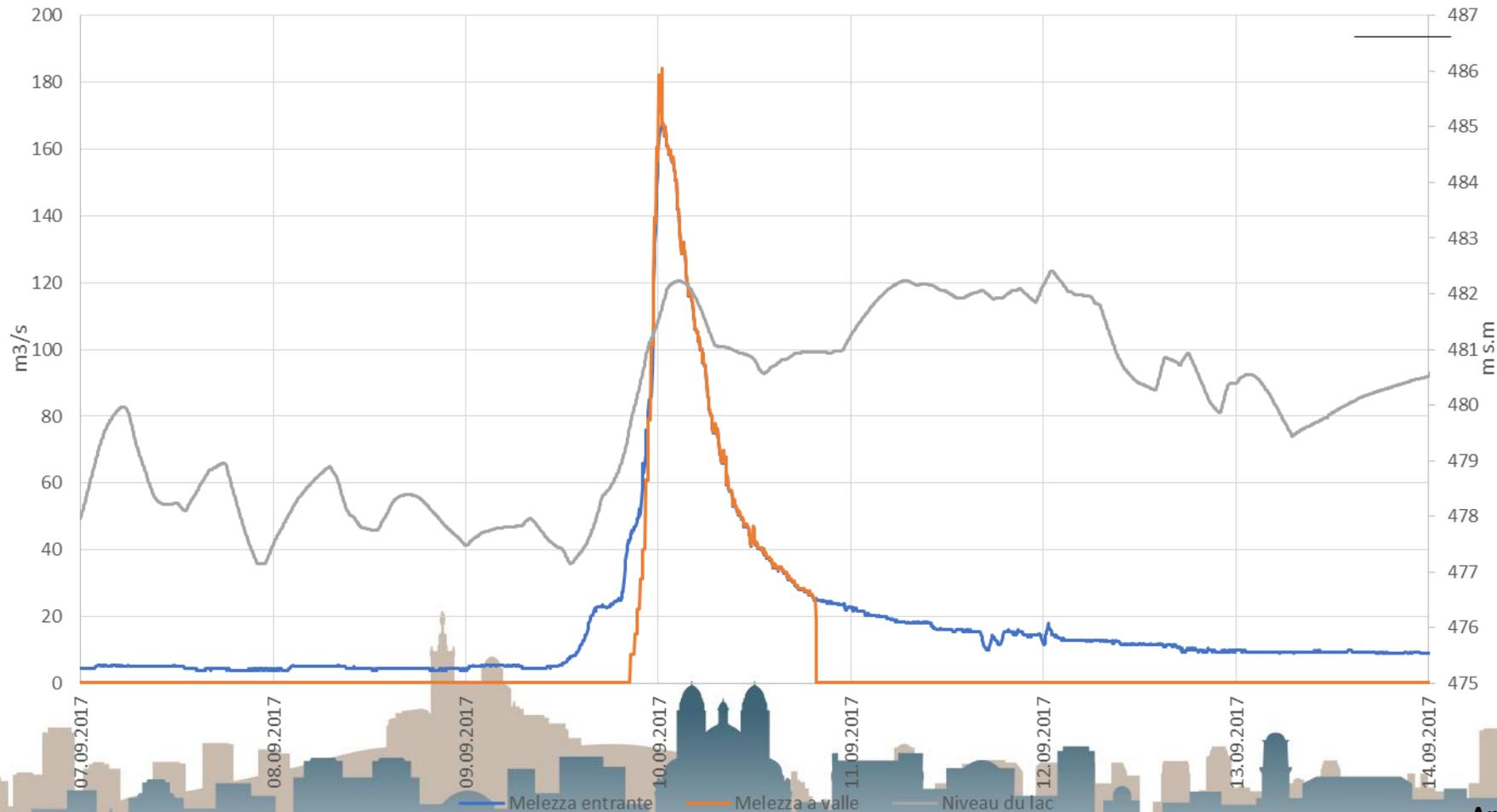
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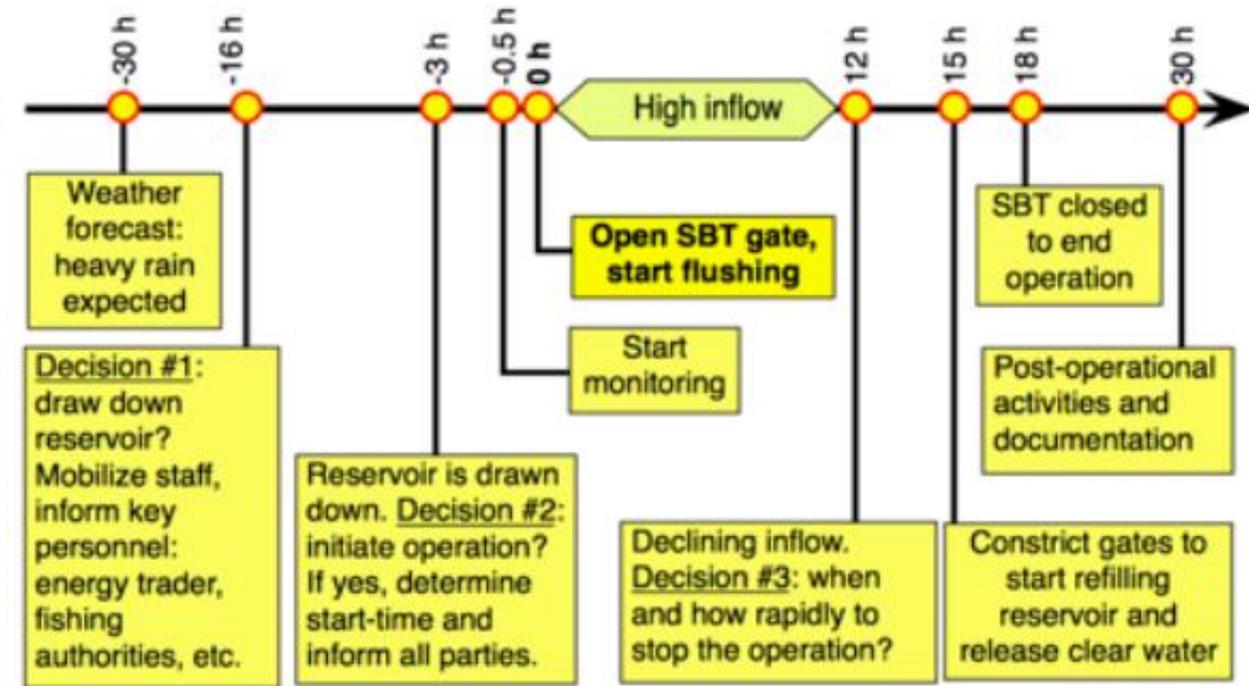
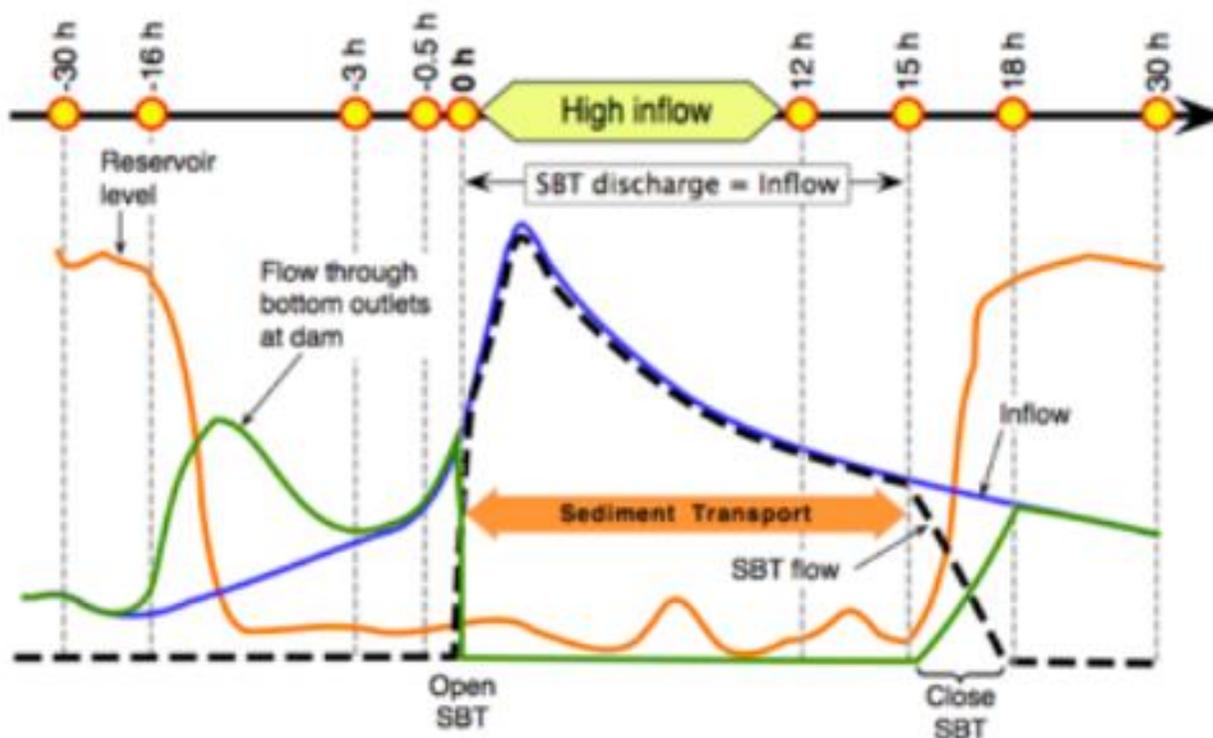
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Solis case study



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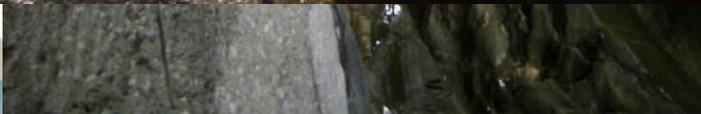
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Thank you for your attention
Merci pour l'attention



Andrea Baumer, OFIMA - Switzerland



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Swiss Committee on Dams

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