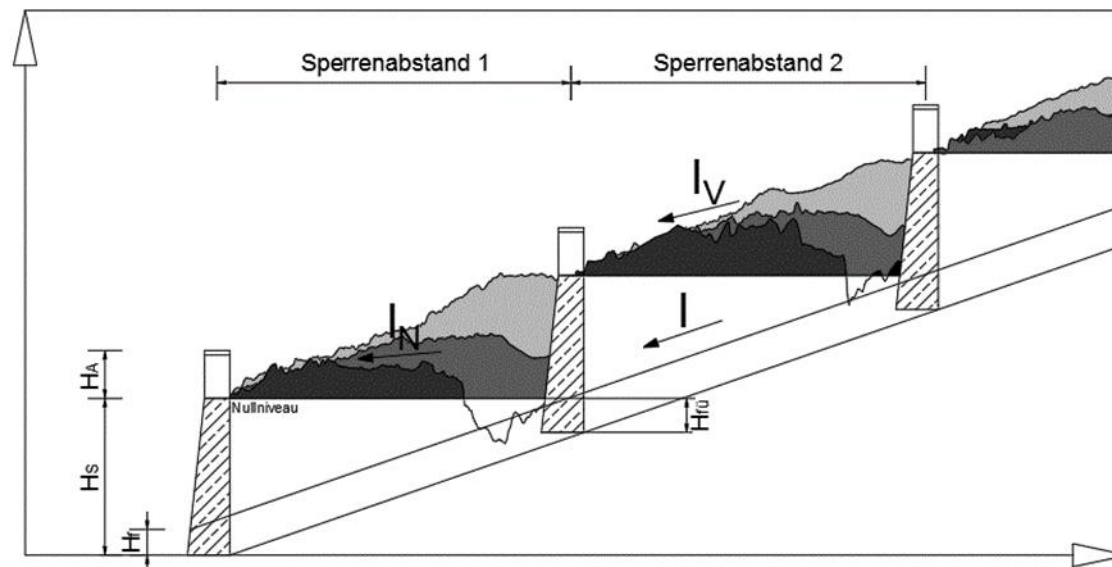


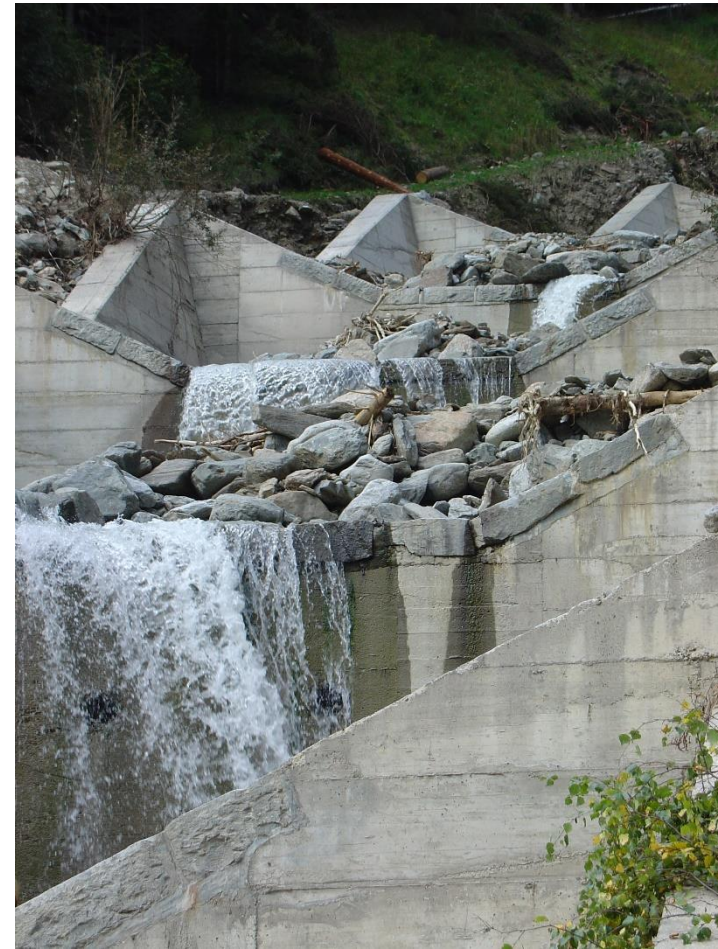
Simple method to determine and optimize sediment rates passing a series of check dams



Johannes Hübl
Johannes Bramberger
Innsbruck, 11.9.2019

The situation

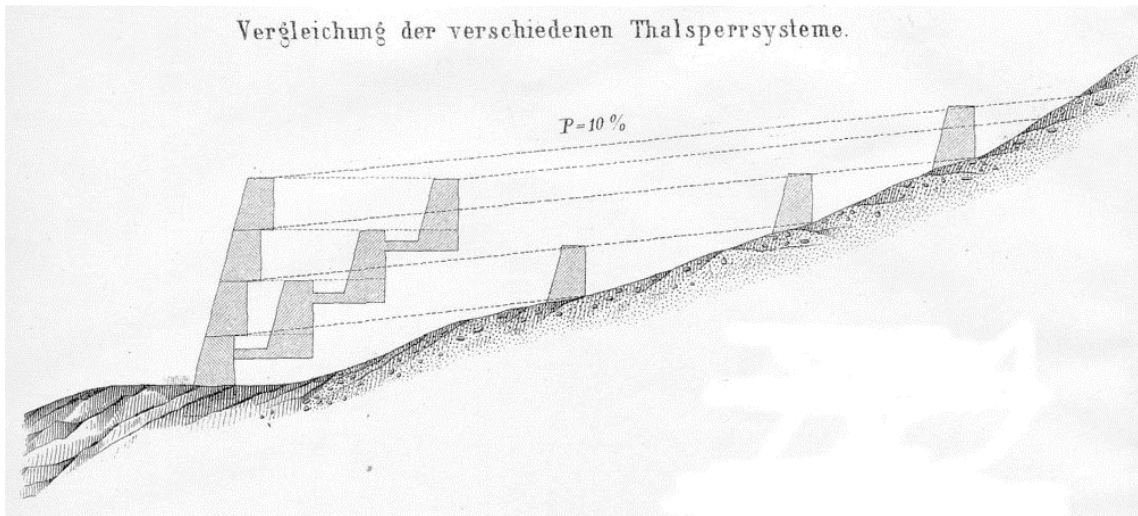
- Series of check dams as a standard to stabilize channels



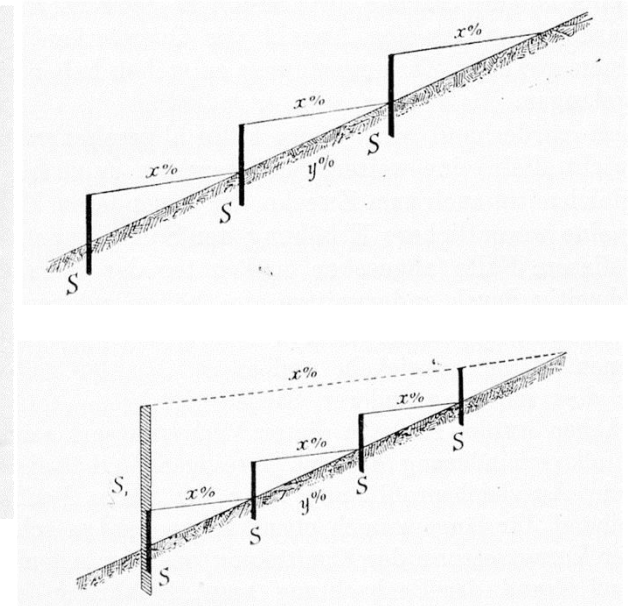
Literature

- Construction of a series of check dams
 - Goal: stabilizing of the channel

Seckendorff, 1880



Wang, 1901

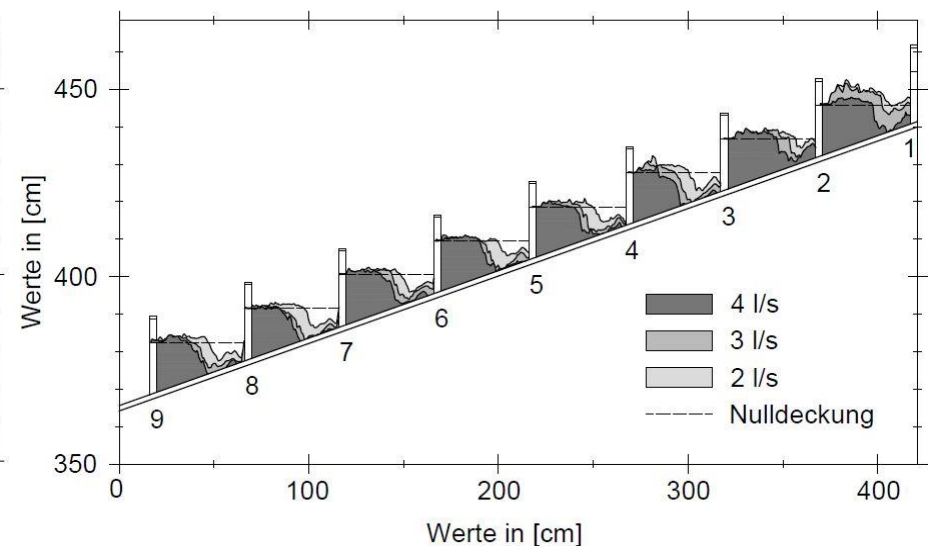
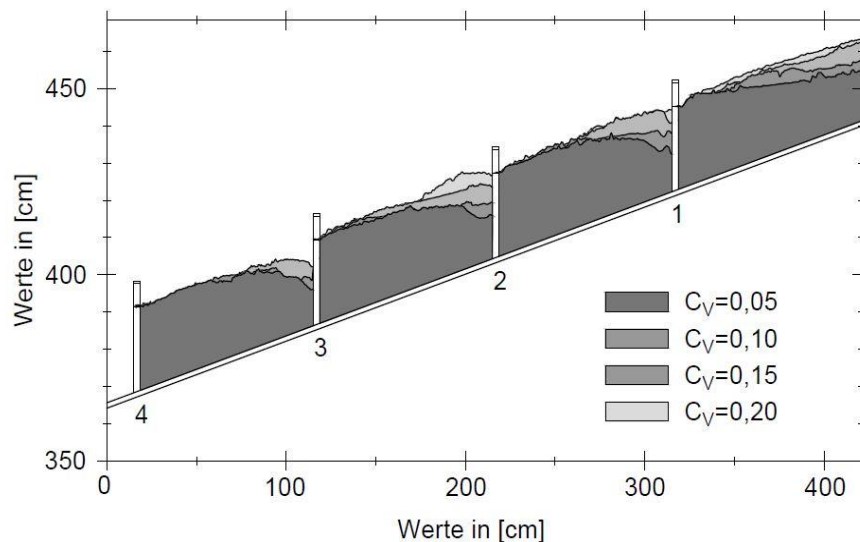


Principles:

- Seckendorff: ...higher structures are more efficient
- Wang: ...instead of a high structure several smaller structures

Literature

- Hampel (1981): channel transition from erosion to deposition
..varying channel slope according to the volumetric sediment concentration on the basis of the difference between slope of compensation and slope of siltation...



Deposition of sediments in a series of check dams (Bramberger, 2018)

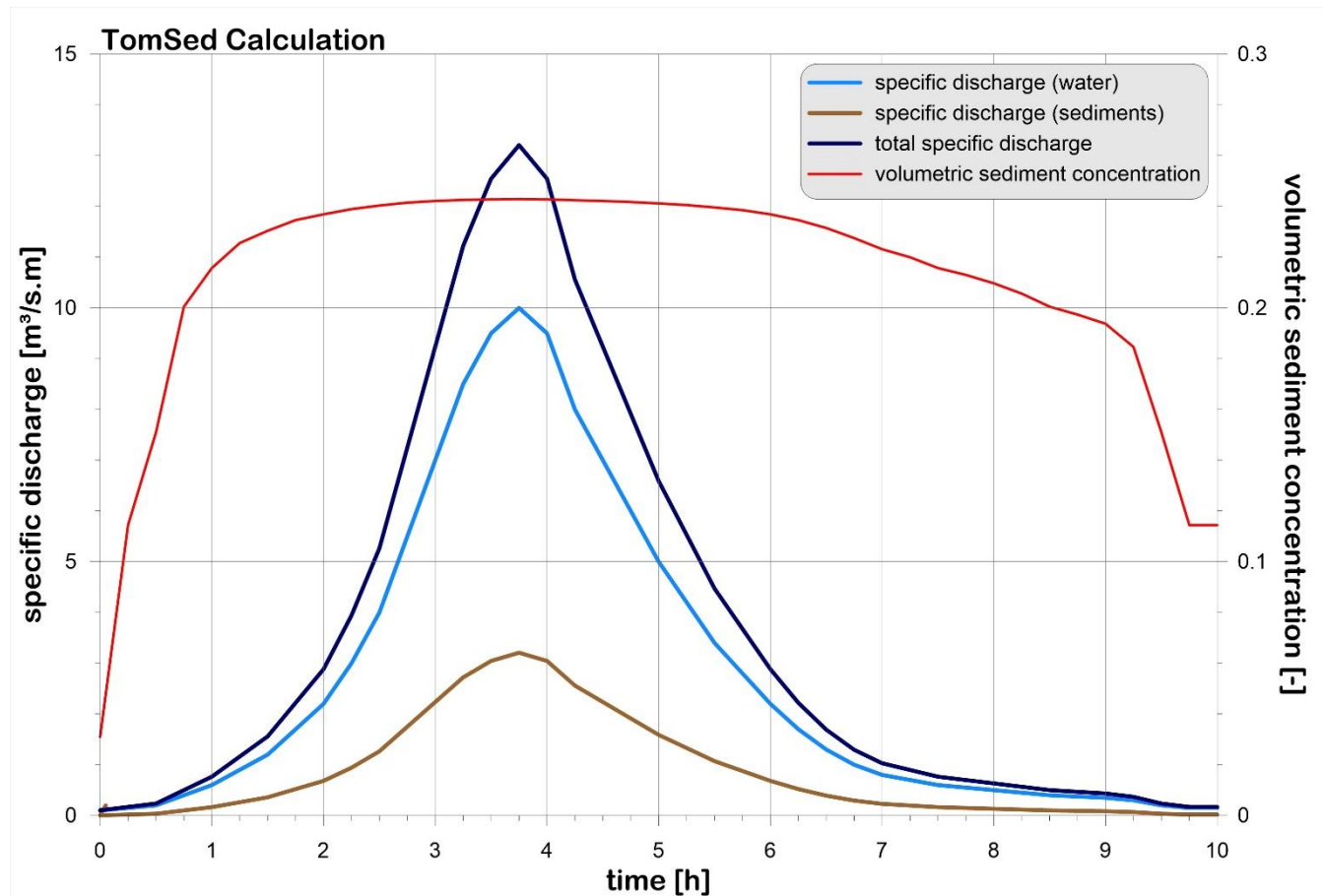
The questions



- How much sediments can be stored during a flood with bedload transport in a reach with a series of check dams?
- Is there a simple method to roughly quantify the sediment deposition in a series of check dams?

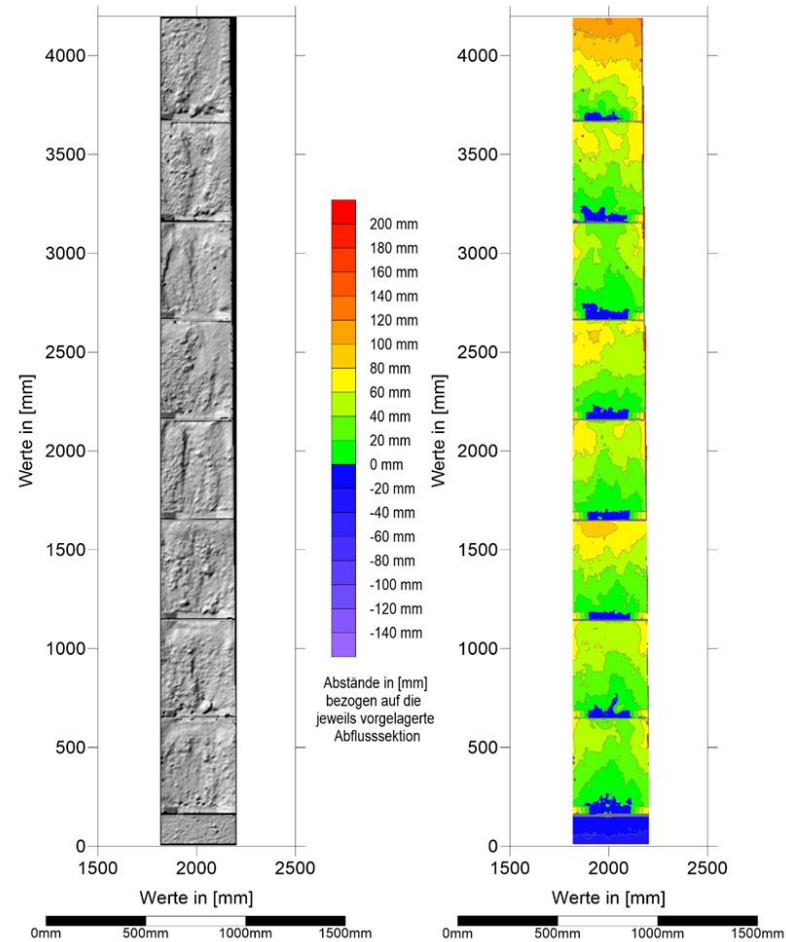
The experiments

- Variable volumetric sediment concentration during a flood with bedload transport



The experiments

- Deposition of sediments in a series of check dams

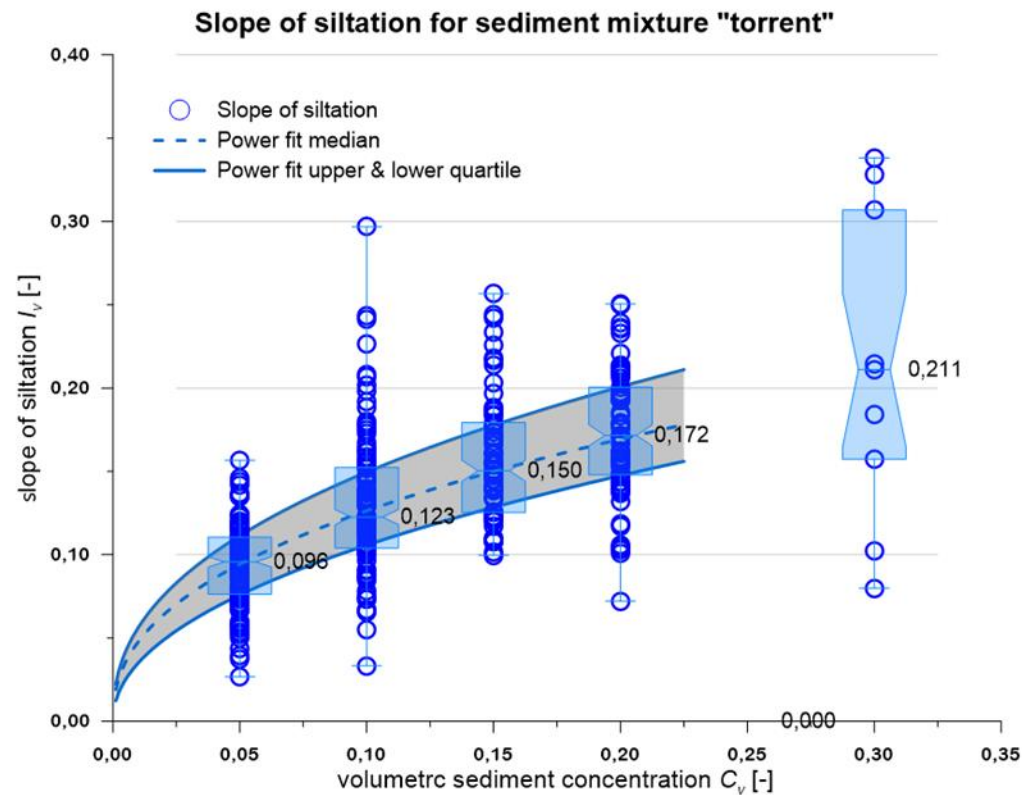


Scan 17: distance between check dams 0,50 m, $C_v = 0,20$, 3 l/s Reinwasser



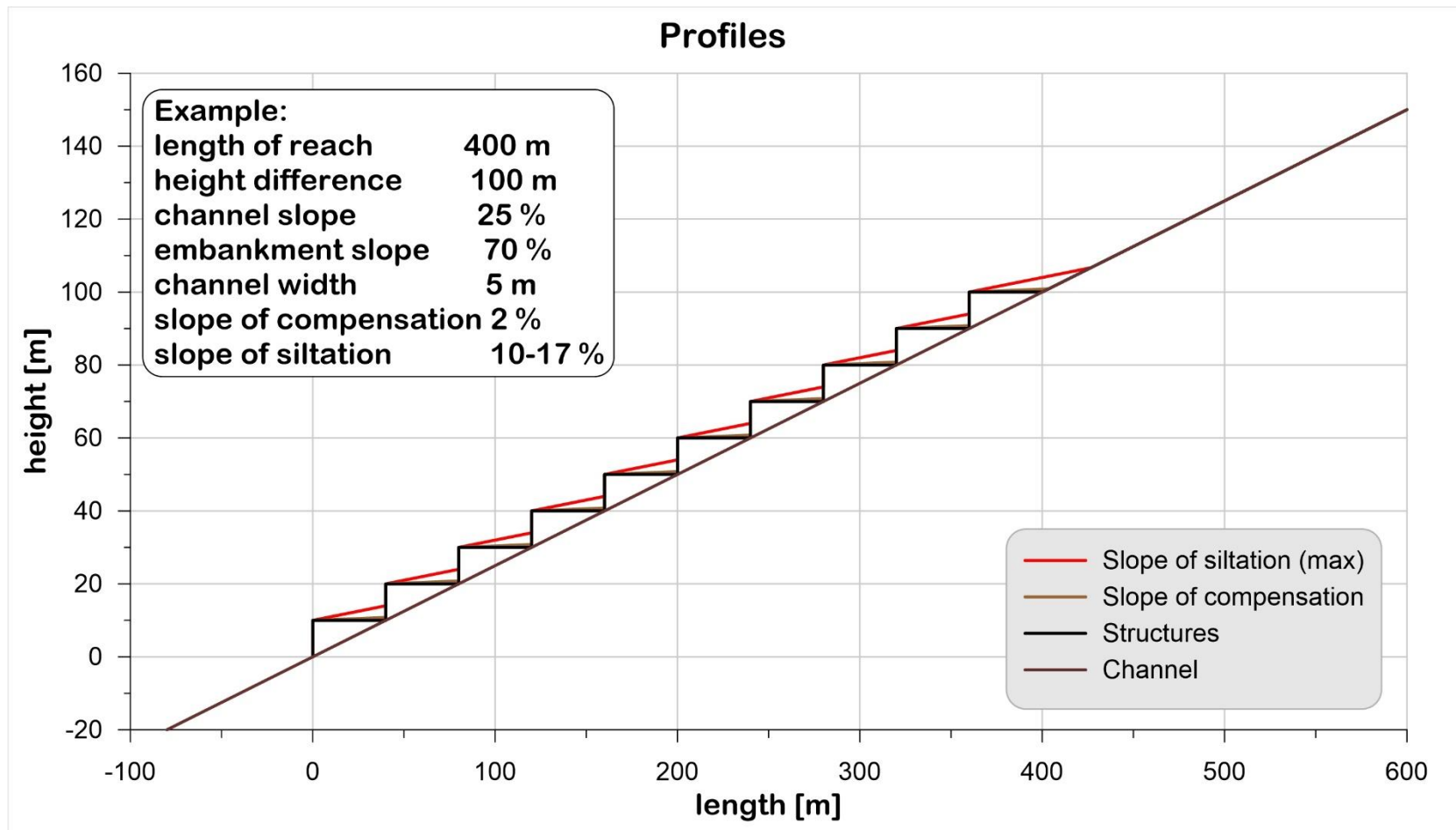
The experiments

- Deposition of sediments in a series of check dams
 - Slope of siltation
 - Slope of compensation



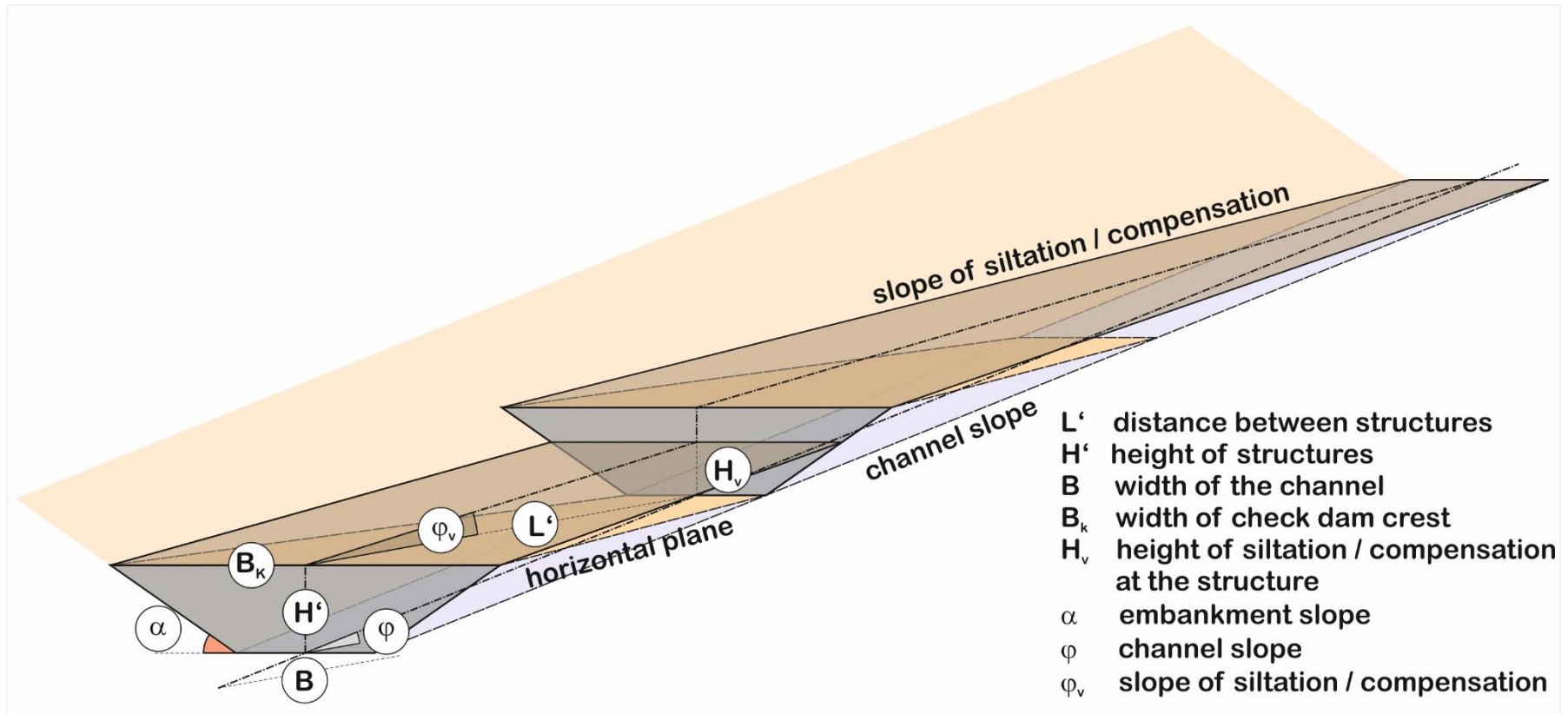
The method

- The longitudinal profil



The method

- Deposition volumes calculated with the geometry of wedges and oblique pyramids

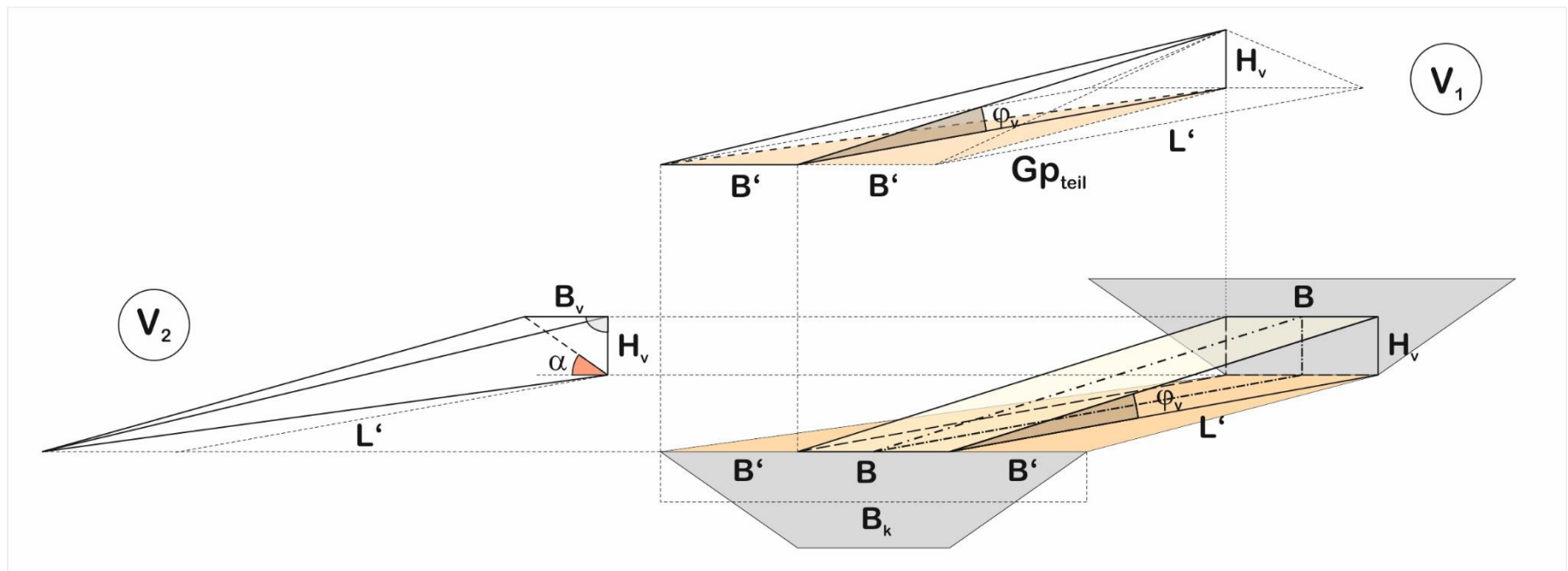


The method

- Deposition volumes calculated with the geometry of wedges and oblique pyramids

example:

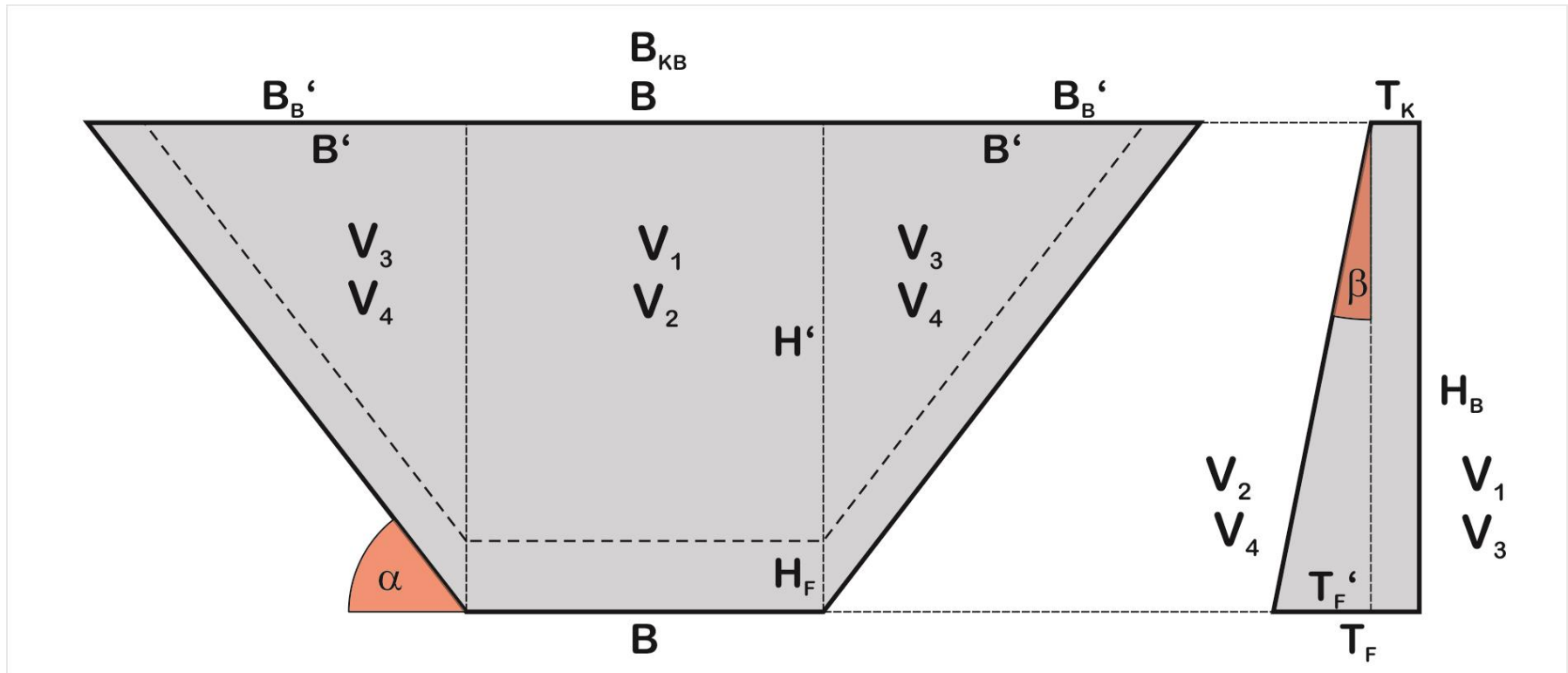
deposition volume between a horizontal plane and the slope of compensation / siltation





The method

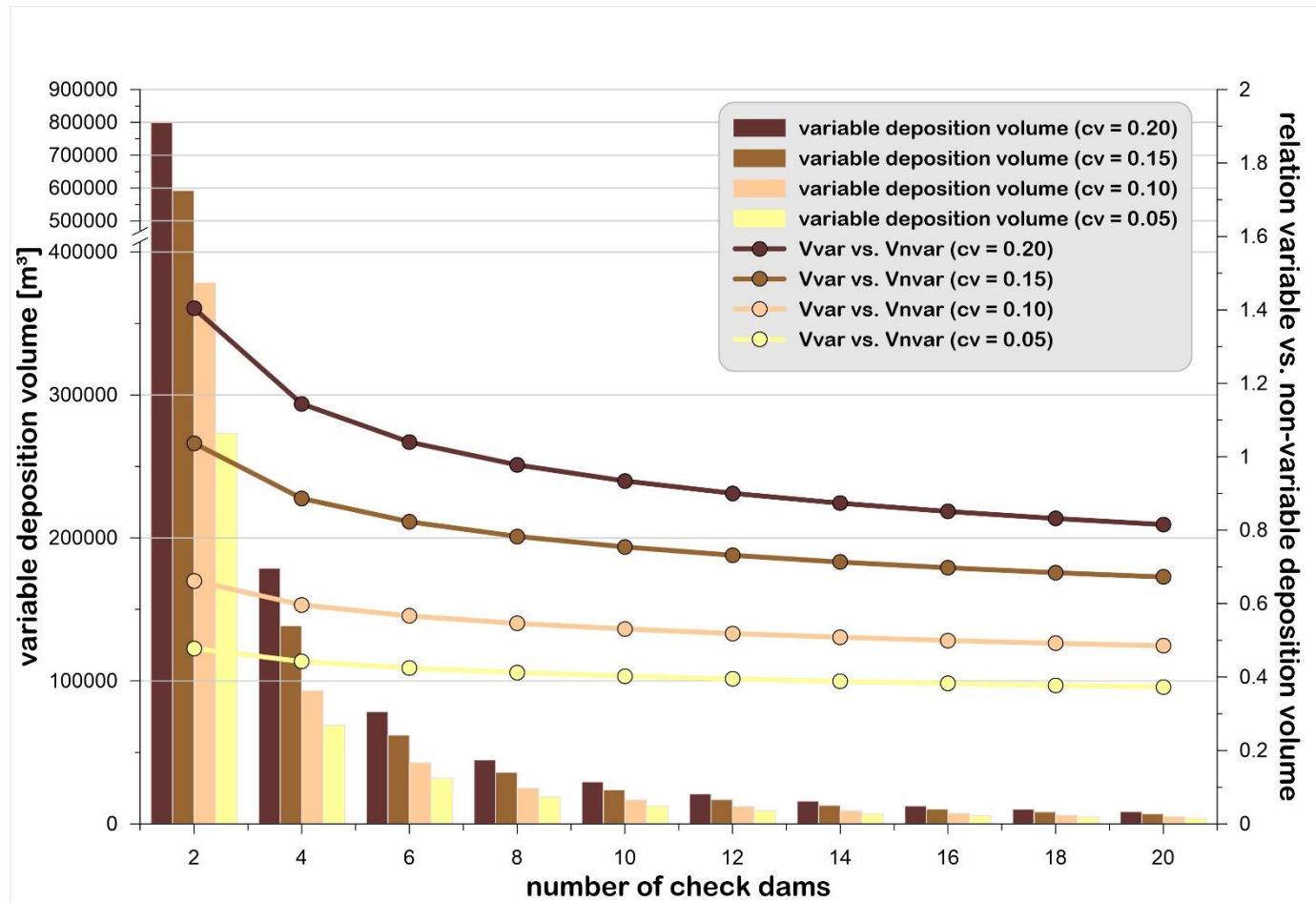
- Check dam volume calculated with the geometry of cuboid, wedges and pyramids





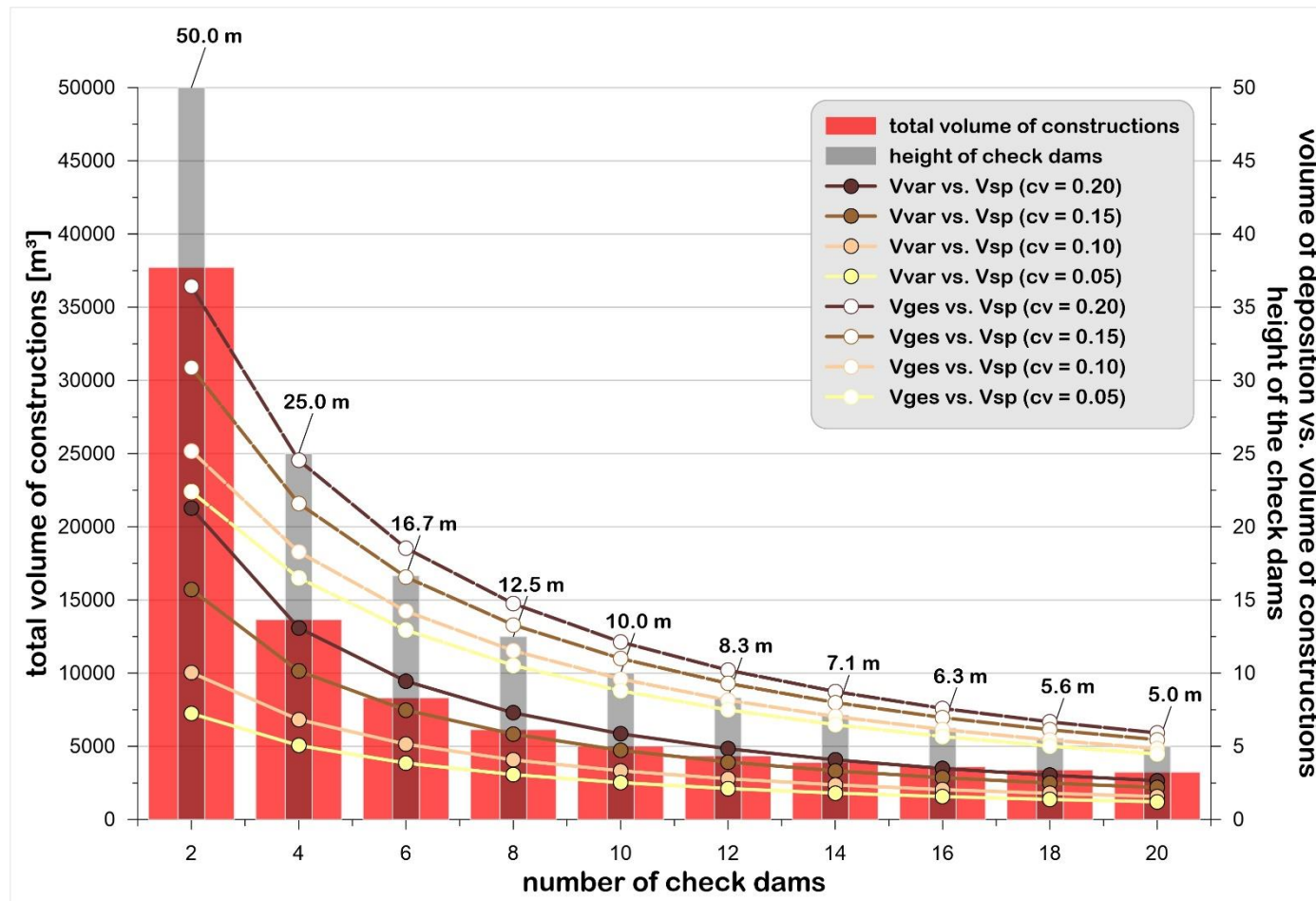
The results

- Variable Deposition volumes



The results

- Total volumes of structures and sediment deposition volumes



The conclusion

- A series of check dams is able to regulate sediment deposition by offering natural balancing processes. Therefore the stabilizing function is turned into a dosing function. Through targeted optimization of the distances and heights of the dams, these dosing effects can contribute to a natural sediment management with a high degree of sediment connectivity.

