



## Lateral groundwater inflows into alluvial aquifers of main alpine valleys

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In alpine regions the topography is mainly characterised by deep incised valleys, mountain slopes and ridges. Usually the main valleys contain aquifers in alluvial soft rock. Lateral these aquifers are confined by mountainous hard rock slopes covered by heterogeneous sediments with different thickness. The slopes can be incised by lateral valleys.

Numerical models for the main alluvial aquifers ask for lateral hydrogeological boundaries. Usually no flow boundaries or Constant head Boundaries are used, even if the lateral inflows to the main aquifers are rarely known. In this example a data set for a detailed investigated and monitored area is studied to give an answer on the location and the quantification of these lateral subsurface inflows.

The study area is a typical main alpine valley with a thick alluvial aquifer (appr. 120m thick), lateral confined by granite, covered at the base of the steep slopes by quaternary sediments (Burger et al. 2012).

The study consists of several steps

- 1.) Analytical calculation of the inflows on the base of investigated and monitored 2d profiles along fault zones (Perello et al 2013) which pinch out in the main valley
- 2.) Analytical models along typical W-dipping slopes with monitored slope springs
- 3.) Evaluating temperature and electrical conductivity profiles measured in approx. 30 groundwater wells in the alluvial aquifers and along the slopes to locate main lateral subsurface inflows
- 4.) Output of a regional model used for the hydrogeological back analyses of the excavation of a tunnel (Baietto et al. 2014)
- 5.) Output of a local numerical model calibrated with a monitoring dataset and results of a pumping test of big scale (450l/s for 10days)

Results of these analyses are shown to locate and quantify the lateral groundwater inflows in the main alluvial aquifer.

### References

Baietto A., Burger U., Perello P. (2014): Hydrogeological modelling applications in tunnel excavations: examples from tunnel excavations in granitic rocks; congress of IAEG, Engineering Geology for Society and Territory, Torino

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Perello P., Baietto A., Burger U., Skuk S. (2013): Excavation of the Aica-Mules pilot tunnel for the Brenner base tunnel: information gained on water inflows in tunnels in granitic massifs, Rock Mechanics and Rock Engineering, DOI 10.1007/s00603-013-0480-x