

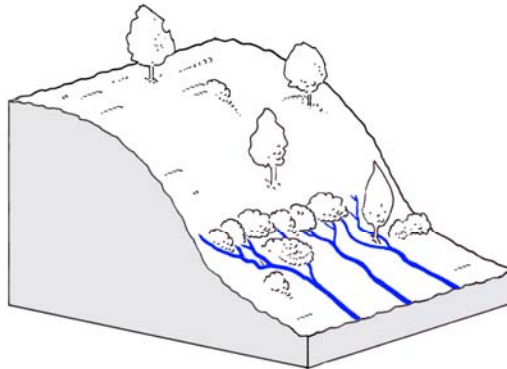
Supplement to the manuscript:

Addressing secondary students' naïve ideas about freshwater springs in order to develop an instructional tool to promote conceptual reconstruction -- Hydrol. Earth Syst. Sci. Discuss., 9, 1589–1617, 2012
by: S. Reinfried, S. Tempelmann, and U. Aeschbacher

The worksheet

How springs occur on mountain slopes

1.) In nature you sometimes see water coming out at the same height in several places at the foot of a mountain slope (see schematic drawing on the right).



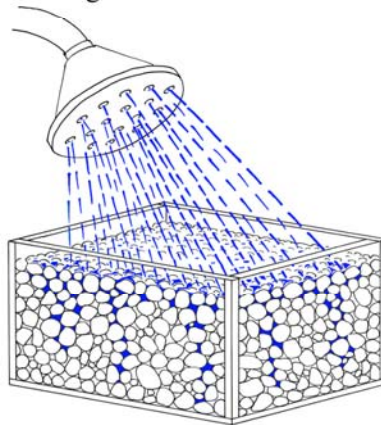
Why is there water coming out at the bottom of the mountain slope? And why are the springs all at the same height?



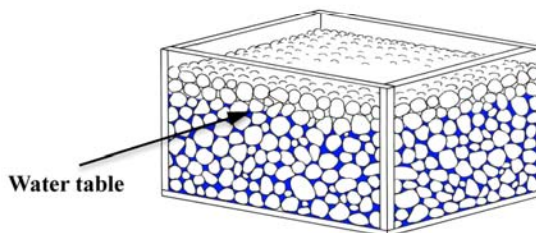
Well, it's a bit like a sandpit.



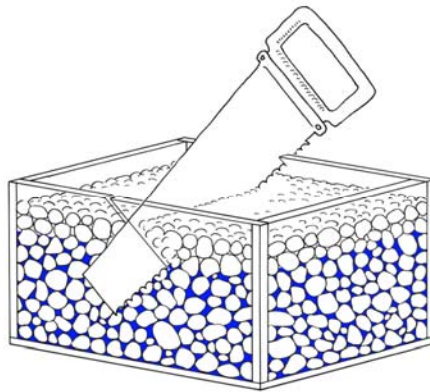
2.) A sandpit filled with sand is showered with water. The water seeps into the tiny voids between the grains of sand.



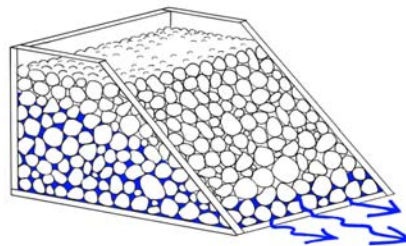
3.) The bottom of the sandpit stores up the water. The voids begin to fill. That's known as groundwater. Eventually a water level establishes itself. The water level is referred to as the water table.



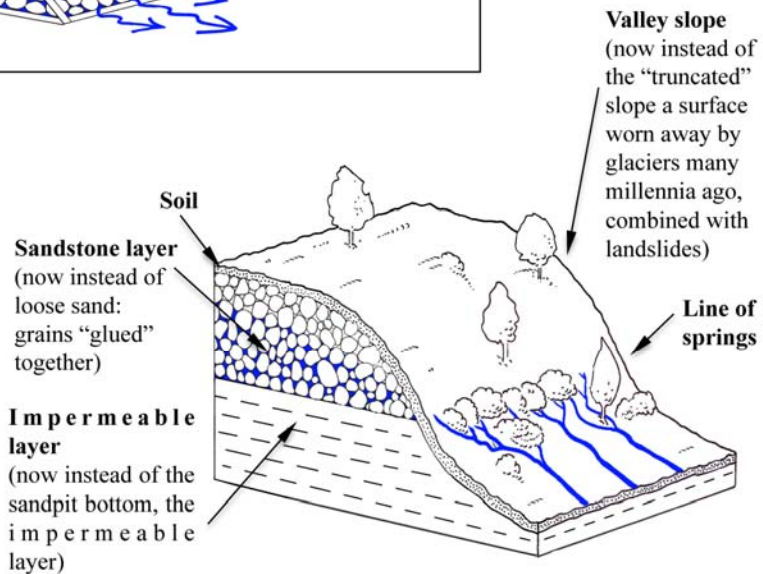
4.) Now imagine you could cut away the sand in such a way as to leave a sloping side.



5.) The water would spill out sideways down the slope, mainly at the bottom because there the water pressure is at its highest.



6.) In a mountain, the rainwater also percolates down between the grains of sand, even though the grains are “glued” together into hard sandstone. Here, too, it flows out sideways, and again mainly down below, that is directly above the impermeable layer. That is why there are often several springs at the same height on the slope (= line of springs).



So a great deal of water can be stored inside a mountain even if there are no caves, i.e. in the countless tiny voids of the sandstone. The water is also able to move through the sandstone, but only very slowly, because it has to “force its way” – as it were – through the voids. So inside the mountain it often only progresses by a few centimetres or metres a day. These water-carrying layers inside the mountain represent huge water reserves from which the water can spill out sideways for many days and weeks.

