

The water balance estimation for catastrophic floods: groundwater contribution

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1. We discuss the existing problems in the study of the mechanisms of formation of catastrophic floods taking into account the possible influence of groundwater. The difficulty in assessing the causes of the disastrous floods is linked to the lack of direct field measurements of precipitation and so, to estimate the water balance in the rain floods. The problems that arise when comparing the results of observations and measurements of rainfall floods are considered.
2. We rely on the concept, where groundwater and surface water are the two coupled factors resulting in catastrophic floods/debris, and they are not isolated systems. These two units are closely related to each other on the territory of a unified watershed under its functioning including the overall transport system, i.e. 3D-network of cracks in the rock (visible manifestation on the land surface of which is the rivershed itself).
3. We estimated the pressure in the aquifer taking the data obtained by the observable mudflow or flood as a base. According to our calculations in the case of a violent release, such pressure for the really observed events can reach tens of atmospheres. Such pressure enhancement may occur due to various external factors (including the nature climatic and seismic processes).
4. A more detailed analysis should be carried out in accordance with a real topology of multiple cracks taking into account the non-stationary process and levels of resistance for water flows in different sections of crack-net (hydrostatic/hydrodynamic pressures in underground aquifers).