Considering artificial drainage

The effects of artificial drainage's is calculated separately and afterwards added to the interflow. The parameterization is done using two grids – a grid containing the depth z_d of the drainage tiles or hoses and another grid containing the horizontal spaces d_h between the drainage devices. If the drainage depth in the depth-grid is zero or the cell has nodata then no drainage is assumed there. The drainage water is added to the interflow of the same layer where the drainage system is located in:

$$q_{drain} = k(\Theta) \cdot \frac{2d_m}{d_h} \cdot \frac{cs}{d_h}$$

(2.14.33)

with q_{drain} drainage from layer m, if drainage tiles or hoses are located in this layer [m/s]
       $k(\Theta)$ hydraulic conductivity as a function of water content and soil type
       d_m layer thickness of the drainage layer m (discretization in z-direction) [m]
       d_h horizontal spacing of the drainage tiles [m]
       cs grid cell size [m]

The term $2d_m/d_h$ is the hydraulic gradient within the layer m which is directed to the drainage system. The term cs/d_h considers the drainage density in this cell thus making the algorithm scale independent. The drainage is added to the interflow of the same layer and thus included in the flux and gradient restrictions. Because the calculation of drainage is included in the iteration of the unsaturated zone, the drainage can affect also the downward fluxes from the layers above.