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[\[PDF \(316K\)\]](#) [\[References\]](#) [\[Supplementary Materials\]](#)**Developing a three-dimensional coupled model of pipe-matrix subsurface flow**[Hyunuk An](#)¹⁾, [Yutaka Ichikawa](#)¹⁾, [Yasuto Tachikawa](#)¹⁾ and [Michiharu Shiiba](#)¹⁾

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Abstract:

Over the past two decades, many studies have reported the presence of soil pipes in hillslopes and their significant influence on rainfall-runoff processes. To analyze pipe flow mechanisms which have complex flow dynamics and interaction with water in the surrounding soil, this study proposed a numerical simulation model which combined a slot model with a three-dimensional saturated-unsaturated subsurface flow model. Soil matrix flow and pipe flow were regarded as separate flow systems and calculated using the individual governing equations, which are Richards equation and the dynamic flow equation. To validate the model, the simulations were conducted for three different conditions (no pipe, open pipe and closed pipe) and showed good agreement with experimental observation data.

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