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Hydrol. Earth Syst. Sci., 12, 257-265, 2008
www.hydrol-earth-syst-sci.net/12/257/2008/

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Temporal variability of subsurface stormflow formation

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Abstract. Subsurface stormflow (SSF) can play a key role for the runoff generation at hillslopes. Quantifications of SSF suffer from the limited ability to predict how SSF is formed at a particular hillslope and how it varies in time and space. This study concentrates on the temporal variability of SSF formation. Controlled sprinkling experiments at three experimental slopes were replicated with varying precipitation intensity and varying antecedent precipitation. SSF characteristics were observed with hydrometric measurements and tracer experiments. SSF response was affected in different ways and to varying degree by changes of precipitation intensity and antecedent precipitation. The study showed that the influence of antecedent precipitation on SSF response depends on how SSF is formed at a particular hillslope. As formation of SSF was hardly influenced by the increase of precipitation intensity subsurface flow rates were not increased by higher intensity. However, timing and relevance of subsurface flow response changed substantially at different precipitation intensities, because saturation and flow formation occurred above the soil-bedrock interface, but also within the topsoil depending on precipitation intensity.

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Citation: Kienzler, P. M. and Naef, F.: Temporal variability of subsurface stormflow formation, Hydrol. Earth Syst. Sci., 12, 257-265, 2008. [Bibtex](#) [EndNote](#) [Reference Manager](#)

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