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The influence of supraglacial debris cover on glacier hydrology: Miage Glacier, Italy.

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The Miage Glacier is a debris-covered glacier in the western Italian Alps. An integrated study of its hydrology, including dye tracing, glacier velocity measurements and water chemistry analysis of the proglacial stream was performed throughout the 2010 and 2011 ablation seasons. These data were used to elucidate the structure and seasonal evolution of the hydrological system. Slower and smaller streams were found to occur on the more thickly debris covered lower glacier, which gave traces indicative of an inefficient subglacial system. This may be due to the uneven topography of the lower glacier, which is characterised by small supraglacial catchments with low ablation rates. The largest streams were found draining the debris free upper glacier, and these gave faster and more peaked returns. This means that unlike on clean glaciers, the tracer velocity was faster with increasing distance up-glacier. The glacier responds dynamically to variations in meltwater input over periods of a few days at the beginning of the melt season, as well as after cooler weather in July. The delaying influence of the debris cover is highlighted in the reduced amplitude of diurnal variations in meltwater discharge, especially early in the season when the upper glacier is snow covered.