



## On the trail of ‘hidden streamflow’ in Luxembourgish catchments

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Tritium measurements are being carried out in well-studied catchments in the Attert sub-basin of the Alzette River in Luxembourg to investigate transit times of baseflow from the various lithologies in the area. Rock-types vary from sandstone with high permeability to marl and schist with low permeabilities. In contrast to other methods, tritium reveals the full spectrum of ages present in streams including ‘hidden streamflow’ (i.e. water older than that measurable by stable isotope or conservative tracer methods) Stewart et al. (2012). In principle, it can also provide ages for individual samples and therefore reveal variations in age with flow if measurements are accurate enough. However, difficulties arise in determining the tritium input function and from ambiguous age solutions due to the past input of thermonuclear tritium. Previous and concurrent geochemical and stable isotope studies are providing complementary information about the systems (e.g. geological controls on catchment storage, mixing potential, isotopic signatures in streamflow) Pfister et al. (2014).

Results to date are showing that old water with mean transit times of about 18 years flow from catchments dominated by sandstone at medium to low flows. These streams also have very homogeneous  $\delta D$  values at such flows showing large storages and mixing potentials. On the other hand, catchments dominated by marl and schist show varying mean transit times ranging from 2 to 20 years depending on flows, although data is limited. The  $\delta D$  values of these streams are scattered and have a decreasing trend with streamflow showing event and seasonal rainfall influence, and thus small storage capacities and mixing potentials. It appears that ‘hidden streamflow’ is alive and well, and living in Luxembourg!

Pfister L. et al. 2014: Catchment storage, baseflow isotope signatures and basin geology: Is there a connection? In preparation.

Stewart, M.K., Morgenstern, U., McDonnell, J.J., Pfister, L. 2012: The ‘hidden’ streamflow challenge in catchment hydrology: A call to action for streamwater transit time analysis. *Hydrological Processes* 26(13), 2061–2066.