Geophysical Research Abstracts
Vol. 20, EGU2018-1632, 2018
EGU General Assembly 2018


# Why do Australian catchments have long transit times?

Ian Cartwright (1) and Uwe Morgenstern (2)

(1) Monash University, School of Earth, Atmosphere and Environment, Clayton, Australia (ian.cartwright@monash.edu), (2) GNS Science, Lower Hutt, New Zealand (U.Morgenstern@gns.cri.nz)

Elucidating the controls on the time required for water to be transmitted through catchments from where it recharges to where it discharges into a stream (the transit time) is critical in understanding catchment behaviour. The mean transit times in several catchments in southeast Australia estimated using tritium vary from a few to several hundred years. There is no simple correlation between catchment attributes such as slope, area, or drainage density and the mean transit times within or between the catchments. Taken as a whole, however, the typical mean transit times are much longer than those estimated for comparable catchments in Europe or New Zealand. These large-scale differences are probably the result of low recharge resulting from a combination of factors. Firstly, native Australian eucalyptus vegetation has high evapotranspiration rates. Secondly, southeast Australia has relatively low rainfall and high evaporation rates. Lastly, the low organic carbon content of the soils and high clay content of the regolith result in low permeabilities.

The long mean transit times result in these catchments only responding slowly to land clearing and changes to rainfall totals and amounts. The transport of contaminants such as nitrates to the stream through the groundwater system is likely to be relatively slow, which may also promote attenuation of the contaminants (e.g., via denitrification). Understanding the controls on mean transit times within catchments is difficult as evapotranspiration rates and the hydraulic properties of the soils and regolith are difficult to measure and may be spatially heterogeneous. Nevertheless, the integration of mean transit time studies with those that examine the flow through catchments in detail would allow a better understanding of the controls on mean transit times.