



## **Using residence time tracers to understand groundwater processes in shallow basement and sedimentary aquifers in Africa, new possibilities and potential limitations**

Dan Lapworth (1), Alan MacDonald (2), George Darling (1), and Daren Goody (1)

(1) British Geological Survey, Groundwater Science Programme, Wallingford, United Kingdom (djla@bgs.ac.uk), (2) British Geological Survey, Groundwater Science Programme, Edinburgh, United Kingdom

Over the last 20 years the environmental tracers chlorofluorocarbons (CFCs) and sulphur hexafluoride (SF<sub>6</sub>) have proved to be important tools in helping to understand groundwater flow and transport processes, complementing modelling and other established hydrogeological methods. To date very few studies have used these tracers to understand groundwater flow processes in the aquifers of tropical Africa. This study presents new residence time data from both basement and sedimentary aquifers in Nigeria and Mali. The limitations on the use of these tracers within the shallow groundwater system are discussed in detail. Limited solubility at higher recharge temperatures reduces the precision of both tracers. CFC degradation under anaerobic conditions was found to be a problem for a significant proportion of sites investigated. Problems due to geogenic sources of sulphur hexafluoride were also encountered but were mainly restricted to basement aquifers. While there are therefore limitations on the use of dissolved gas tracers in these aquifers, in the absence of comprehensive hydrogeological data they can provide important information on the groundwater flow processes of this vital and potentially vulnerable resource.