Geophysical Research Abstracts, Vol. 8, 03091, 2006
SRef-ID: 1607-7962/gra/EGU06-A-03091


# Characterising groundwater movement and residence time in a lowland chalk catchment in southern England

**D.C Gooddy**, W.G. Darling, P. Shand and D.W. Peach

British Geological Survey, Maclean Building, Wallingford, Oxon, OX10 8BB, UK
(dcg@bgs.ac.uk / Fax: +44 1491 692345 / Phone: +44 1491 692328

The Water Framework Directive is a major driver for change in catchment management within the European Union. In the UK, the focus of a large body of experimental hydrology has been on uplands whereas the majority of management pressures lie in the lowland areas. Scientific understanding of the major UK aquifer systems is relatively poor, and the available tools for integrated modelling of surface water-groundwater interactions are limited. In addition, the groundwater residence time and flow processes in these systems are not well characterised. As a response to these issues, the Lowland Catchment Research programme (LOCAR) was conceived and initiated.

Chlorofluorocarbons (CFCs) and sulphur hexafluoride ($SF_6$) provide a technique for 'dating' groundwaters up to 50 years old. When combined, CFCs and $SF_6$ can help to resolve the extent to which groundwater mixing occurs, and therefore provide indications of the likely groundwater flow mechanisms. This and other geochemical data collected from groundwater and surface water from a lowland Chalk catchment in southern England suggest that the groundwater movement at this site can be divided into a number of flow regimes. On the interfluves of the catchment, 'piston' flow dominates, with a bulk groundwater age of the order of decades; at the valley bottom, there is mixing between shallow groundwater and stream water; and in an intermediate zone between the top and the bottom of the valley the data are consistent with approximately 3:1 mixing between new and pre-tracer groundwaters. There is evidence that surface-water groundwater interactions are highly influenced by hydrogeological heterogeneity in the valley floor sediments. These interactions may be taking place down to 10 metres or more. A conceptual model of groundwater movement has been developed to describe the catchment processes