



## **Fallout radionuclides as tracers of erosion processes in large catchments; limitations and possibilities**

Dr Hancock, Dr Rustomji, Dr Caitcheon, and Dr Wilkinson

CSIRO Land and Water, Catchment and Aquatic Systems, Canberra, Australia

Over the last 30 years fallout radionuclides have provided unique information on erosion processes controlling the mobilisation, transport and deposition of soils and sediment in river catchments. In particular, naturally-occurring  $^{210}\text{Pb}$  (excess) and  $^7\text{Be}$ , together with anthropogenic  $^{137}\text{Cs}$  have provided data leading to contemporary estimates of topsoil and subsoil erosion that were used to develop catchment sediment budgets. These tracers can be applied at much lower costs in-stream sediment load monitoring, or localised hillslope erosion monitoring.

The use of these nuclides on a catchment-wide scale may require some generalised assumptions about the characteristics of erosion sources, some of which may be difficult to verify. These difficulties include sampling considerations, correcting for differing soil/sediment particle size distributions, overbank storage of sediment and resuspension of material deposited within the river channel. The two latter issues relate to the time deposited sediment is retained in the river system.

This paper will discuss the strengths and limitations of using fallout tracers and provide examples of how these tracers can be applied to large catchments to provide the greatest confidence in the results. Tracers can provide crucial data for the calibration of sediment budget model parameters and validation of model output in a combined measurement and monitoring approach.