

Combining caesium-137 measurements and suspended sediment load data to investigate the sediment response of a small catchment in southern Italy

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Abstract A long-term measurement programme was operated in southern Italy during the 1960s and 1970s, to provide information on the suspended sediment yields from the main river basins. Information obtained for the rivers of Calabria suggests that suspended sediment yields in this area are relatively low. However, there is evidence that the intensity of land degradation within the upstream catchments is substantially higher than suggested by the values of specific sediment yield and there is a need to explore the relationship between on-site soil loss and downstream sediment yield more closely. Monitoring time-integrated erosion rates over large areas has traditionally required extensive long-term measurement programmes employing experimental plots. The fallout radionuclide caesium-137 (¹³⁷Cs) offers an alternative means of documenting medium-term rates of soil loss. This paper describes the use of ¹³⁷Cs measurements and the available sediment load data to explore the links between soil erosion, sediment redistribution and storage, and sediment output for a medium-scale (41.3 km²) catchment in Calabria. Data available from a sediment load monitoring programme undertaken at the catchment outlet during 1962–1977 have been used to estimate the longer-term catchment sediment yield. This estimate has been combined with information provided by the ¹³⁷Cs measurements, to establish a medium-term sediment budget for the catchment. The results provided by the ¹³⁷Cs measurements indicate that the catchment is subject to much higher rates of soil loss and land degradation than suggested by its specific sediment yield. These findings are consistent with the results obtained for other catchments in Calabria for which both ¹³⁷Cs derived erosion rates and measured sediment yields are available.

Key words sediment load; caesium-137; soil redistribution; erosion; sedimentation; sediment budget; Italy