Geophysical Research Abstracts, Vol. 7, 05886, 2005
SRef-ID: 1607-7962/gra/EGU05-A-05886

Quantifying diffuse pathways for overland flow between the roads and streams of the Eucalypt forests of south eastern Australia

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0.1 Limiting connectivity between road runoff sources and stream networks is crucial for preservation of water quality in forested environments. Where flow is non-eroding, the length of hillslope available to accommodate volumes of discharged water is the key to restricting connectivity. Hairsine et al. (2002) proposed a probabilistic model of diffuse overland flow that predicted the hillslope lengths required to infiltrate road discharge, based on the concept of volume to breakthrough (Vbt). This study extends this analysis to a different forest environment with the aim of testing the portability of the Hairsine et al. (2002) model. The volume of flow required to travel overland to a distance of 5 and 10 metres (Vbt5 and Vbt10) from drainage outlets was measured in deep, highly conductive mountain soils in the Upper Tyers catchment, Victoria, Australia. Rainfall, hydraulic conductivity and soil depths contrasted markedly with those in the Hairsine et al. (2002) study, and represent an extreme in Australian forests. Statistical analyses revealed the population of Vbt5 to be indistinguishable from that observed by Hairsine et al. (2002), indicating the model is valid for a range of forest soils. There was no significant correlation of sediment plume length with site characteristics such as slope, width of flow, or existence of incised pathways. It is suggested there are universal properties of pathways draining tracks and roads, with bioturbation acting to restore available pore spaces filled by antecedent plumes. Physically-based infiltration modelling supported this hypothesis. Drain discharge design criteria may be developed for local conditions using the Hairsine et al. (2002) model, providing a robust tool for protection of water quality in the siting of new forest roads, and maintenance of exiting roads and tracks.

1 Reference

Hairsine PB, Croke JC, Mathews H, Fogarty P, Mockler SP. 2002. Modelling plumes of overland flow from roads and logging tracks. *Hydrological Processes* **16**: 2311-

2327.