Geophysical Research Abstracts
Vol. 14, EGU2012-6876, 2012
EGU General Assembly 2012

Muted response of fine-grained sediment to a wildfire in British Columbia: the role of landscape disturbances and driving forces

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In August 2003 a severe wildfire burnt the majority of Fishtrap Creek, a 170 km2 watershed near the city of Kamloops in central British Columbia. The objective of this study was to determine the influence of the wildfire on the amount and composition of fine sediment delivery and transport in the system and to see if the wildfire altered the main sources of sediment. In addition, the findings are compared with that of a nearby watershed, Jamieson Creek, with similar characteristics that was unburnt. In both watersheds, suspended sediment concentrations and fluxes were determined using ISCO automatic water samplers. Changes in sediment sources were determined by collecting bulk sediment and source material samples, and by analysing these samples for a range of properties, including environmental radionuclides and C and N isotopes. Results suggest that following the wildfire there was no major response in fine sediment delivery and transport in Fishtrap Creek, when compared to Jamieson Creek, although there were noticeable differences in the composition of the fine sediment transported and stored in the channel bed. This muted response may be due to the fairly low rainfall amounts in the period immediately following the wildfire. Environmental fallout radionuclides (caesium-137 and unsupported lead-210) showed that there was limited increase (<10%) in the relative contribution from hillslope (vs subsoil and channel bank) sources of sediment. Recent changes in sediment fluxes and sediment sources relate more to bank erosion processes, probably due to loss of root strength and cohesion. The results suggest that in some situations wildfire may not produce the dramatic increases in hillslope erosion and sediment transport often documented in other watersheds. In Fishtrap Creek, channel bank erosion appears to be important in supplying fine material to the channel and this suggests that attention should be directed at managing the riparian zone in watersheds affected by wildfires.