Twelve years of post-fire erosion and runoff research in the Colorado Front Range

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Abstract. The initial effects of fires on soils can be nearly as dramatic as the effects of fires on vegetation. While the changes in soils generally are more fleeting than the effects on vegetation, the combined effects cause striking changes to forest hydrology in the first few post-fire years. We measured sediment yields and runoff rates after two wildfires in the Colorado Front Range to quantify the short-term impact (up to 10 years) of fire on hillslope processes. At the Bobcat fire, initial post-fire erosion rates were as high as 10 Mg ha^{-1} yr^{-1} and declined rapidly in the first few years after burning. At the Hayman fire, initial erosion rates were 22 Mg ha^{-1} yr^{-1} and declined at a slower rate than at the Bobcat fire. Surface runoff rates at the Hayman site averaged 5-20% of rainfall rates during 4 storms in the first post-fire year, and while the runoff fraction declined over time, it was still as high as 4% in the seventh post-fire year. The differences between the two sites, including the less productive, more erodible soils at the Hayman site, can explain some of the observed differences in sediment yields. The event-based erosion rates measured in these two fires exceed the erosion rates in unburned forests by several orders of magnitude, but they were not especially unique when compared to the range of post-fire erosion rates from around the western US. The relatively long duration of elevated sediment yields at the Hayman site however, may be more unusual as compared to other sites.