Geophysical Research Abstracts, Vol. 7, 10372, 2005
SRef-ID: 1607-7962/gra/EGU05-A-10372

A method for the rapid assessment of the probability of post-wildfire debris flow from recently burned basins in the inter-mountain west, U.S.A.

S. Cannon, J. Gartner, M. Rupert, J. Michael

U.S. Geological Survey, Box 24056, DFC, MS 966, Denver CO 80225 cannon@usgs.gov / Fax: (303)273-8600 / Phone: (303)2273-8604

The increased incidence of catastrophic wildfires in the western United States and the encroachment of human development into fire-prone ecosystems have created a critical need for methods to quantify potential hazards posed by debris flows produced from burned watersheds. Debris flows are one of the most hazardous consequences of rainfall on recently burned hillslopes. We generated eight possible models that can be used to estimate a basin-scale probability of post-wildfire debris-flow activity using logistic regression analyses on a database from 401 basins that were burned by 15 recent fires located throughout the inter-mountain west. The models describe debris-flow probability as a function of several readily-obtained measures of areal burned extent, soil properties, basin gradients, and rainfall from short-duration convective rainstorms. Evaluation of the success and effectiveness of the models using data from the 2004 Hot Creek Fire in central Idaho, and a procedure described in Chung and Fabbri (Natural Hazards, 2003) indicates that debris-flow probability in the inter-mountain west of the U.S.A. can be well represented as a function of the basin area burned at a combination of high and moderate severities, basin ruggedness (Melton's number), the percentages of clay and organic materials in the soil, and the average storm rainfall intensity. The model can be used to identify those basins that are most prone to post wildfire debris-flow events in response to convective rainstorms and to provide information for post-fire mitigation and evacuation planning.