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Fragmentation characteristics in rock avalanche deposits

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Field observations and simple laboratory tests can be used to characterize rock avalanche accumulations and to find possible controlling factors on their transport and emplacement mechanisms. We collected and analysed data from the accumulations of two different rock avalanches from the Central Italian Alps. We compare these with data in the literature concerning rock avalanching, rock fragmentation and comminution. We observed that the Weibull distribution can fit a small part of the entire particle size distribution of debris samples, with mean value of the curve shape factor of 0.537 Ďb 0.284. This range is considered typical of multiple comminution, or fragmentation with considerable shearing and continued comminution. The fractal approach allows a more complete fitting. The computed fractal dimension ranges between 1.3 and 3.2 within the accumulation and with average values of about 2.6-2.7. These values cover the range between the theoretical values for fragmentation models presented in the literature. This suggests that both texturally immature and mature deposits form the main accumulation and that more than a single comminution process acted during the rock avalanche motion. The spatial description of the grain size distribution within the deposit and the segregation show the trend of variation of the fractal dimension and of the fragmentation process. We computed, by different empirical laws, the required fragmentation energy.