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# Time between snow slab avalanche events

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A waiting time analysis of 16,000 slab avalanche events collected in two avalanche areas over 23 years from 111 avalanche paths is given. The assumptions of the rare events approximation are used: namely that the events do not overlap in time and space and the probability of events is small over a suitable time scale. Random Poisson events are assumed with the waiting time being exponential for an individual avalanche path. The analysis from the probability of the union of events from all the avalanche paths in an area shows that scale invariance of waiting time is not possible for the entire avalanche areas. However, self-similar clustering of event waiting times is possible for some individual avalanche paths with long mean waiting times between events. Mean waiting times range between about 5 days to 1000 days for the individual paths.

Assuming the individual avalanche paths are independent gives the probability of the intersection of events as a product. The analysis shows that the mean waiting times for the avalanche paths are log-normally distributed for both avalanche areas. For purely random Poisson events, the auto-correlation function is exponential for description of the waiting time for a path. The frequency power spectrum for all the avalanche paths in an avalanche area is determined under the assumption the distribution of waiting times is log-normal. Calculation of the power spectrum shows that 1/f noise is not possible for the collections of avalanche paths in the two avalanche areas over any significant frequency range. The principal reason is that the variance of the log of waiting times is too small. In combination, the results suggest that time arrival of avalanche events does not conform to that of a critical system as defined for self-organized criticality or thermodynamics. If snow avalanches are to conform to a critical system in geophysics then a revision of the definition is called for.