



Source scaling of volcanic eruption seismicity

V.M. Zobin

Universidad de Colima, Observatorio Vulcanologico, Colima, Mexico (vzobin@ucol.mx)

Majority of earthquakes recorded during the lava extrusion at andesitic volcanoes are associated with the explosions and pyroclastic flows. Analysis of the seismic records observed during the 1998-2005 eruption at Volcán de Colima, México, allowed to obtain some source scaling relations for volcanic seismicity. Pyroclastic flow and rockfall earthquakes are the products of the partial collapse of lava bodies. A log-log plot of the seismic signal duration intervals versus the number of events of this duration evidenced a robust linear dependence between the parameters. This relationship indicated a power-law distribution of the size of seismic signals related to pyroclastic flow and rockfall earthquakes. This relationship is typical for fractal sets and may indicate the self-similarity in the dimensions of the pieces that were broken off during the gravitational destruction of the lava body. Analysis of the explosive type of events showed that they were ranged in energy within nine orders, varying from 1×10^4 to 1×10^{13} J. The size-frequency distributions of these events displayed the difference in the source properties for large ($E > 1 \times 10^{11}$ J) and small explosions. Application of the Kolmogorov-Smirnov test demonstrated that the seismic signals associated with small and large explosions belong to different samples.