SUPLEMENTARY MATERIAL (SM)

Description of the videos

This SM includes three videos that show two scenarios of rock fragmentation and mass flux dynamics triggered by rapid decompression: continuous and discontinuous. File S1 (N57Video) correspond to the experiments N57, the discontinuous dynamics, and file S2 (N58Video) corresponds to experiment N58, the continuous dynamics. File S3 is a close-up of the fragmentation phase taken from experiment N57. This shows details of cracks development and the related elasto-acoustic signals. We used Phantom High-Speed cameras V710 and V711. The videos were recorded at a rate of 20000 frames/s for experiment N57 and at 35000 frames/s for N58. To plot and synchronize the frames and the elasto acoustic signals (see Figures 6, 9 and 10), we developed a Python code using NumPy (Harris et al., 2020), SciPy (Gommers et al., 2020) and Matplotlib (Hunter, 2007) packages and the open-source library OpenCV for computer vision applications. The videos run at 10 frames/s.

File S1 (N57video). Frames of the experiment N57 synchronized with the traces shown in Figure 10. From left to right, the four panels depict the traces trimmed in the 0.38 s– 0.52 s, 0.41 s – 0.5 s, 0.43 s – 0.44 s, 0.494 s – 0.497 s time ranges, respectively. As the video runs, a moving red line points to the time on the traces at its corresponding panel correlating the signals with the video (left panel). The signals are displacement records normalized with respect to the maximum displacement at S6 and are plotted along the y-axes as the location of its corresponding sensor along the HPA, distinguished in colors. The 2nd panel depict the same records, in the time window related to layers jam and block of the mass flux. Panels 3rd and 4th show a zoomed in of 2nd and 5th signals displayed in the 2nd panel, respectively. All signals are normalized with respect the maximum amplitude in S3. See sections 7 for details.

File S2 (N58Video). Frames of experiment N58 synchronized with the traces shown in Figure 6. From left to right, the two panels depict the traces trimmed in the in the 0.38 s– 0.53 s, 0.425 s – 0.5 s time ranges, respectively. As the video runs, a moving red line points to the time on the traces at its corresponding panel correlating the signals with the video (left panel). The signals are displacement records normalized with respect to the maximum amplitude at S7 and are plotted in the y-axes as the location of its corresponding sensor along the HPA, distinguished in colors. The second panel depict sustained low amplitude tremor associated with mass flux. See sections 6 for details.

File S3 (N57video2). Frames of the fragmentation time window from 0.399 to 0.403 s of experiment N57 synchronized with the traces shown in Figure 9. This video shows details of the fracture development, and the signals generated during the fragmentation process in N57. Shaded areas indicate the time-window of gas ejection; accumulated between the diaphragms (green), and between the lower diaphragm and the sample (blue). The

colored and numbered curves splitting into two indicate the fracture aperture. Overlapping the fractures curves are the velocity records registered at S2, S3 and S4. The fractures curves are plotted along the y-axes as they occur, and the signals are plotted as the location of its corresponding sensor along the HPA. The blue line between panels indicates the time phases interval and the red asterisks indicate the aperture time of each diaphragm. For more details see section 7.1.

References

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