Negative avalanches and anomalous dilation in a granular fault.

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Résumé

When slowly shearing a granular system, we expect a slow accumulation of mechanical energy and a global dilation, interrupted by sudden avalanche-like events associated with energy release and a contraction of the structure. However, when shearing a compressed medium, we report a much richer behavior of the avalanches: all four combinations between sudden contraction or dilation coupled with abrupt energy release or accumulation are possible. Modifications in the stress network, captured by the photoelastic properties of the grains, can help us understand the four scenarios. Among them, we will primarily focus on the understanding of the totally counterintuitive regime where a sudden energy accumulation is coupled with dilation. Those particular events do not result in a relaxation of the granular system, but instead in a more charged configurations more likely to trigger other extreme events.

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