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## Stress-induced melting of plagioclase during laboratory earthquakes

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Impact rocks often reveal particular structures, e.g. shock-induced amorphization and melting of crystals, that formed due to high stresses during shock metamorphism. This experimental study presents four granulite samples that were deformed in a D-DIA apparatus at 2.5 GPa and 3 GPa and at either 1023 K, 1173 K, or at 995 to 1225 K. During deformation of two samples (2.5 GPa and either 995-1125 K or 1173 K) 82 and 794 acoustic emissions (AEs) were recorded, respectively, whereas less than 10 AEs were recorded while deforming the other two granulite sample (3 GPa and 995-1225 K; 2.5 and 1073 K). Microstructures of the samples that emitted 82 and 794 AEs reveal amorphous patches that are absent in the samples corresponding to the runs in which <10 AEs were recorded, indicating a link between AE-activity and amorphization of plagioclase. The contacts between amorphous patches and host-plagioclase crystals are very sharp and amorphization predominantly occurred along two distinct planes inclined at approx. 45° towards the direction of maximum compression. Surrounding the patches, the hosts show extensive fragmentation. Chemical analyses of the amorphous patches demonstrate an enrichment in potassium and silicon relative to the initial plagioclase chemistry and the growth of euhedral quartz crystals within the patches. Such microstructures were previously found in naturally or experimentally shocked rocks and interpreted as shock melts. The occurrence of structures, revealing striking similarities to shock melts, in experimental samples that underwent embrittlement at high-pressure, high-temperature conditions below the sample's solidus (~1377 K) suggests melting due to elevated transient stresses, e.g. during rupture processes.