**[MS18-P17] Laserinduced dynamic strain measurements in granular rocks and minerals**

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Dynamic strain applied in short impulses can affect materials drastically. In technological applications dynamic strain can be a result of switching processes such as switching on of a fuel cell or heat source cycling in a melt furnace. In the natural environment, dynamic strains travel through rocks as a result of tectonic events resulting in earth quakes and volcanic eruptions. In single crystals, strain impulses travel with the speed of sound of the material concerned. In granular materials, the limiting factor is the propagation of strain from one grain to another along a sequence of grain contact points. This makes the process several orders of magnitude slower. For the present experiment, we have selected polycrystalline quartz and cryptocrystalline flint as model samples to study the effect of grain size. Slate is used in comparison with quartz to investigate the effect of grain aspect ratio in silicatebased rocks, and marble (limestone) is contrasted with flint as finegrained representatives of silicate and carbonate based minerals.

In this experiment, we have simulated the effect of dynamic strain on these granular rocks by applying repeated nanosecond Nd:YAG laser pulses to a slice of rock while measuring the diffraction pattern at various displacements from the impact site. The laser and the Mythen positionsensitive detector on beamline I11 were jointly driven by a pulse generator to produce a repeatable time structure comprising a single shock followed by a 1ms diffraction exposure to provide maximum time resolution. Frames subject to dynamic strain have a distribution of lattice parameters resulting in a net broadening of each Bragg peak. Since a single exposure provides insufficient statistics to analyse peak broadening, a number of these 1ms exposures are added in a rolling average procedure. This approach balances acceptable statistics with the probability of capturing the strain wave as it travels through the beam. The average strain in each of these averaged exposures is determined using a Pawleyle Bail fit of the whole pattern in Topas software.

Initial results show that the largest strain is observed at a displacement of about 1mm from the impact site and that it disperses monotonically over a distance of about 8mm. Further analysis is currently in progress with the aim of understanding the effect of strain impulses on the different rock types studied.