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MEMIN shock recovery experiments at low shock pressure (2.5-17.5 GPa) with sandstone.

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This MEMIN project is focused on experimental shock deformation (2.5 to 17.5 GPa) in dry and porous sandstone. The goal is to detect and pressure-calibrate shock phenomena for the identification of small or eroded natural impact craters in sediments. Special attention is paid to the influence of porosity on progressive shock metamorphism because the onset of formation of certain shock effects in porous targets is totally different from that in non-porous rocks. First results show a complete closure of pores at already 2.5 GPa and a weak mosaicism of quartz at 7.5 GPa and higher pressures. The number of fractures increases up to 10 GPa and decreases afterwards to 17.5 GPa due to increasing formation of different kinds of melt. First PDF could rarely be observed at pressures of 12.5 GPa but are clearly identifiable at higher pressures. Some single quartz grains are partly (≥10 GPa) or entirely (≥15 GPa) transformed to diaplectic quartz glass although, in quartz single crystals, its formation requires ~35 GPa which clearly indicates local pressure peaks (2-4 times higher than the nominal value) due to pore collapse (confirmed by numerical modelling).

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