

SHOCKED QUARTZ AT THE KAMIL CRATER (EGYPT).

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Impact melt glass occurs at the recently discovered Kamil Crater in southwestern Egypt - a rayed crater, 45 m in diameter on a Cretaceous sedimentary (mainly quartz-arenites) target [1,2]. The glass forms centimeter-scale masses scattered up to a distance of 100 m from the crater rim, or is stuck to the surface of some of the thousand shrapnel specimens of the meteorite that formed the crater, the Gebel Kamil iron. It mainly consists of vesicular, brown to colorless siliceous glass and Fe-Ni droplets entraining clasts of quartz-arenites, testifying to melting of the target and - to some extent - of the projectile during the impact, as a result of the local attainment of shock pressure >60 GPa.

Shock deformation features in the quartz grains of the quartz-arenite clasts embedded in an impact melt mass stuck to the surface of one Gebel Kamil shrapnel were studied by optical microscopy. They vary from clast to clast, ranging from undulose extinction associated with pervasive planar fractures (PF) spaced 15-20 μm apart, to blocky undulose extinction associated with undecorated planar deformation features (PDF), typically spaced 3-5 μm apart. Multiple sets of PDF may occur in individual crystals, sometimes with differently oriented sets occurring in different parts of the crystal.

The crystallographic orientation of 28 PDF planes in 4 quartz grains <100 μm in size was determined using a U-stage and indexed following [3]. Critical sets of PDF include those parallel to the rhombohedra $\{10\bar{1}3\}$ and $\{10\bar{1}2\}$, with less abundant PDF parallel to the trigonal dipyramid $\{11\bar{2}2\}$ (Fig. 1). This assemblage indicates shock pressures >20 GPa, according to [3].

The occurrence of PDF in bedrock quartz crystals embedded in shock melt provide strong evidence that the Kamil Crater was produced by a hypervelocity impact.

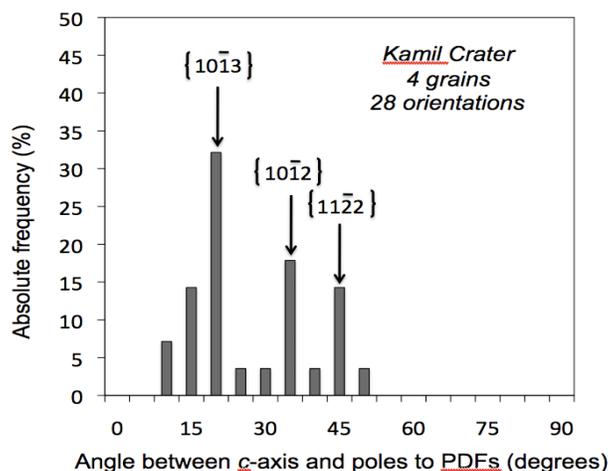


Fig. 1. Histogram (binned at 5°) showing PDF orientation in quartz crystals embedded in the Gebel Kamil impact melt.

References: [1] Folco L. et al. 2010. *Science* 329:804. [2] Folco L. et al. 2010. *Geology* 39:179-182. [3] Stöffler and Langenhorst 1994. *Meteorit. Planet. Sci.* 29:155-181.

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