

**COMPARISON OF ORIENTATION MEASUREMENTS  
OF PLANAR DEFORMATION FEATURES AND  
TECTONIC DEFORMATION LAMELLAE IN QUARTZ**

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**Introduction:** Orientation statistics of planar microstructures in quartz are often used as proof for a shock origin of the lamellae (e.g. [1, 2]). We use a combination of Universal Stage (U-stage) and electron backscattered diffraction (EBSD) to collect and compare orientation data of planar deformation features (PDFs) and tectonic deformation lamellae (DL) in quartz.

**Methods and samples:** The 3D orientations of PDFs and DL as well as the c-axis of the quartz grains are measured in a Universal stage (U-stage). EBSD measurements are used to determine the full crystallographic orientation of the grains. Orientation measurements are indexed according to the standard method described by [3]. Three samples from the Ries crater (Germany) and one from the Rochechouart crater (France) are used to measure PDF orientation; for DL two samples from the Flinders Range (Australia) and one from the Ardennes (Belgium) are studied.

**Results:** Orientation plots of PDFs and DL are very similar. There are no obvious differences on the basis of which can be determined whether planar microstructures in a sample have a shock or a deformation origin. However, for DL, the percentage of unindexed sets is high: generally ~20-25% vs. ~5-15% for PDFs.

**Conclusions:** Orientation plots alone are not enough to prove the shock origin of lamellar microstructures in quartz.

**References:** [1] Badjukov, D.D. et al. 1987. 18th Lunar and Planetary Science Conference, pp. 38-39. [2] Bice, D.M. et al. 1992. *Science* 255(5043): 443-446. [3] Ferrière et al. 2009. *Meteoritics & Planetary Science* 44(6): 925-940.