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LETTER

Lightning-induced shock lamellae in quartz

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ABSTRACT

Using transmission electron microscopy we show that planar deformation lamellae occur within quartz in the substrate of a rock fulgurite, i.e., a lightning-derived glass. These lamellae exist only in a narrow zone adjacent to the quartz/fulgurite boundary and are comparable to planar deformation features ("shock lamellae") caused by hypervelocity impacts of extra-terrestrial objects. Our observations strongly suggest that the lamellae described here have been formed as a result of the fulgurite-producing lightning strike. This event must have generated a transient pressure pulse, whose magnitude, however, is uncertain at this stage.

Keywords: Shock lamellae, fulgurite, lightning, planar deformation features, transmission electron microscopy