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Shatter cones: Nature and Genesis

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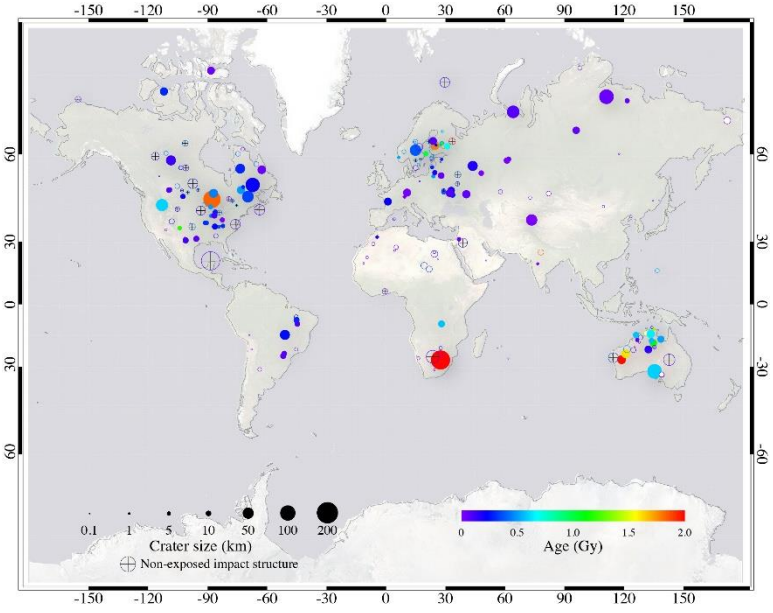
Shatter cones (originally: *Strahlenkegel,* [1]) are the only distinct meso- to macroscopic recognition criterion for impact structures [2], but the processes related to their genesis are still largely obscure. Development of new techniques to characterize the surface morphology and interior of these features, and new observations, also regarding possibly related shock metamorphic effects, have been made recently, and new experiments have been carried out over the last decade. These are presented as 8 original contributions following an introduction paper in a special issue of Meteoritics & Planetary Science entitled "Shatter cones: Nature and Genesis". The introduction, which is our topic for this conference, includes a compilation of the literature on shatter cones and a database of shatter cone occurrences at known terrestrial impact structures. The database reports the presence or absence of shatter cones, and the nature of the rocks showing shatter cones. As ambiguous or dubious shatter cones have occasionally been reported in the literature, the descriptions of alleged shatter cones and the available imagery were carefully screened in order to establish where the criteria for the presence of shatter cones are met.



Among the 189 known impact structures, 133 are exposed; of these, 77 are unambiguously associated with shatter cones (Figure 1). Ambiguous observations of shatter cones have been reported for 8 impact structures. Shatter cones have also been reported from the Agoudal (Morocco) site [3], for which there is no other evidence for the presence of an impact structure, and at Bernhardzell (Switzerland), where shatter cones have been considered to occur on distal ejecta from the Ries crater.

Figure 1: World map of shatter cone occurrences. Filled circles: impact structures associated with shatter cones; white circles: ambiguous observation; open circles: exposed structures without shatter cone reports.

All pertinent hypotheses of shatter cone formation are discussed in the introduction. Several may be discarded in the light of most recent observations. The branching fracture mechanism [4], the shock wave interference models [5] and a new phenomenological model [6] require further evaluation.

References:

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