The determination of the shape and size of terrestrial impact craters is problematic, yet is critical to understanding cratering mechanics and for scaling bolide mass, volume and impact velocity with crater size and target response (1). The problem is particularly difficult in older geological terrains (e.g. Precambrian) which are more likely to have suffered post-impact deformation and hence distortion of the original structure and/or where weathering may have partly removed or obscured its original shape. Traditionally, a number of features are used to assist us in determining the shape and size of an impact structure. These include (a) the occurrence of faults, especially those disposed concentrically relative to the crater: the outermost ring faults being interpreted as indicating a viable minimum diameter and (b) the development of so-called breccias (2), some of which are also associated with faults (e.g. the Sudbury Breccia developed within the target rocks of the Sudbury Struture of Ontario, Canada). "Breccia" is not a satisfactory term because a number of breccia-types exist at impact sites (e.g. fall-back breccias and in-situ brecciated target material).

Recognition of the different types and dimensions of pseudotachylyte occurrences at impact sites is important. Small-scale pseudotachylyte development should not be automatically attributed to pre- or post-impact faulting unrelated to impact. For example, many impact structures contain basement rocks that are pervaded by thin (< 1 mm thick) pseudotachylyte veins that are clearly unrelated to any obvious endogenically-generated fault. Such pervasive zones are common at the margins of the melt sheets in the vicinity of overturned lithologies. The development of densely veinied zones of pseudotachylyte may be the result of...
rebound and transient crater collapse. Also, the presence of pseudotachylyte at the extremities of the structure can be used as an important indicator of crater size.

References


