



Fig. 21a

Fig. 21b

Fig. 21. Comparison of ejecta dynamics for single-body and clustered impactors at normal and 45° impact angles. The first frame indicates moment of impact followed by 1, 5, 10, 50, 100, and 150 ms. Figure 21a shows a vertical single-body impact by 0.635-cm-diameter aluminum (0.376 g) into compacted pumice at 1.61 km/s, (821120) and can be compared with a clustered pyrex impact (0.298 g) into the same target at 1.77 km/s (830526). The single-body impact quickly establishes a conical plume that progressively becomes wider at the base. In contrast, the clustered impact (Figure 21b) results in a cloud that slowly evolves into a conical plume at very late times with progressively increasing angles from the surface. Large clumps of shock-lithified ejecta are visible in the original frames of the movie records for the clustered impact experiments (bottom photograph, Figure 21b). Oblique impacts (Figure 21c and 21d) by single and clustered impactors are significantly different. The single impactor produces a plume that is initially asymmetric but becomes symmetric at late times (0.635-cm pyrex (0.298 g) sphere at 1.55 km/s into compacted pumice; 830541). The clustered impactor, however, never produces a symmetrical plume shape; rather, the plume forms an inclined curtain that moves downrange (0.298 g clustered pyrex at 1.62 km/s into compacted pumice; 830538).