strong north–south components. As the Earth's magnetic field points northward, any oncoming southward fields reconnect with it; and the stronger the fields and the faster they approach, the faster the reconnection rate. Without reconnection, the Earth's field acts as a barrier to shield the near-Earth region, the magnetosphere, from the solar wind. But reconnection breaks the barrier and allows solar wind particles and energy to pour into the magnetosphere at a rate proportional to the reconnection rate. Through a series of magnetospheric processes, the energy gained drives the currents that make the magnetic storm and accelerates both the infiltrating solar wind particles and local particles to create the aurorae. So although it is true that aurorae are caused by energetic particles, they are locally energized and different from those associated with mass ejections and flares.

Thanks to Gosling, a new solar–terrestrial exhibit planned for the Smithsonian's Air and Space Museum in Washington DC will get the flare story right. Early exhibit plans that actually promulgated the 'solar flare myth' are what sparked his revisionist crusade. The exhibit now recognizes the central role of coronal mass ejections. Although solar flares are intrinsically interesting phenomena, and predictions of their occurrence are important for protecting space travellers from potentially lethal X-ray doses, we now understand that they do not cause aurorae, magnetic storms or major energetic particle events. □

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METEORITICS

Star of the small screen

David W. Hughes

EVERY year, many thousands of meteorites fall to Earth, but unfortunately for museums and meteorite collectors, the vast majority are never found. In contrast, the Peekskill meteorite[1] almost seems to have been trying to publicize its arrival, skimming low over a highly populated area of the United States before crashing to Earth through the rear of a car (shown in the photograph).

Meteorites are small asteroidal fragments that survive their transit through the Earth's atmosphere. This gaseous blanket retards them from a typical space velocity of 75,000 km h^{-1} to a relatively benign 150 km h^{-1}, albeit with considerable surface mass loss and the production of prodigious heat, light, ionization and sound. Meteorite parents usually have masses in the 10 kg to 10^6 kg range. Smaller bodies burn out in the atmosphere; larger ones punch through, producing craters in the Earth's surface and destroying themselves in the process.

Before the Peekskill meteorite fall, discussed by Brown and colleagues on page 624 of this issue[1], only three atmospheric trajectories had been photographed accurately enough for the Solar System orbit of the parent body to be calculated. Several photographs of the fireball trains were needed in each case.

John E. Bortle

IMAGE
UNAVAILABLE
FOR COPYRIGHT
REASONS

When two worlds meet — the car that suffered a most unusual collision.

From the observer's point of view, the Peekskill meteorite had many advantages. It hit the atmosphere on a near-grazing trajectory, giving the resulting fireball a visible path that was over 700 kilometres long. It was first seen over Kentucky and then moved north-northeast over West Virginia, Pennsylvania and New Jersey before finally landing in Peekskill, New York. The timing could hardly have been better. It fell shortly before 8:00 p.m. local time (23:48 UT) on 9 October 1992, when many people were outside watching high-school football games. Some had their camcorders with them. Startled by the vivid greeny-white ball of fire streaking across the sky, some momentarily forsook the football on the pitch and filmed the meteorite instead.

Brown *et al.* have analysed fourteen of the resulting videos. Frame by frame, they have been able to follow the fate of the incident meteorite as it ablated and fragmented. Never before has such a wealth of data been available. The incident body was seen to break up into about 70 pieces when it was 41.5 km above the ground. Four main fragments probably hit the ground, but the only one found so far is the 12-kg chondritic rock that hit Michelle Knapp's 1980 Chevrolet Malibu.

The orbit of the incident body was perfectly normal, having a perihelion distance of 0.886 astronomical units (1 AU is the distance from the Earth to the Sun) and an aphelion distance of about 2.1 AU, on the inner edge of the main asteroid belt. What was unusual, though, was its low angle of incidence. The most probable angle is 45° (refs 2, 3), but Peekskill came in at only 3.4° and nearly bounced off the atmosphere. The last well-recorded[4] 'bouncing' meteorite was visible for over 100 seconds as it travelled the 1,500 km between Salt Lake City and Calgary on 10 August 1972, coming within 58 km of the ground.

Another fascinating characteristic of Peekskill, and one that owes its discovery to the videos, was that the luminosity of the incident parent flickered at a frequency of about 6 Hz before it fragmented. Maybe this was caused by the molten surface dripping off the parent body every 2 km along the flight path.

It is a pity that only one fragment has been found. Others are probably strewn over an 80 by 15 km field. As to the future, perhaps asteroid-watchers should stake out their Chevys as bait and see what happens . . . . □

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