240 km. The prevailing winds are from the northwest and there are many parallel eolian features that have an azimuth of approximately 300°. The predominate erosional factors are snowmelt and the spring rains. Most of the 53-cm annual precipitation occurs from March to May.

The soil is predominantly Peoria loess with an estimated depth of ~260 m [2]. This is probably underlain with limestone bedrock. Well records of the area have not been very helpful in resolving this question.

The Merna Crater is an approximately 1.6-km-diameter, 23-m-deep, well-preserved depression with a flat bottom. It is located about 18 km west of and 2.4 km south of Merna, Nebraska. This site is on the USGS 7.'5 Callaway N.W. Nebraska 1951 topographic map.

The crater covers most of section 9 and the eastern portion of section 8. The coordinates of the crater center are approximately longitude 99°58' 20"W and latitude 41°27'30" N. A significant landmark on section 9 is the Cliff Union Church and Cemetery, which is on the eastern rim of the crater.

Even though the land has been plowed for more than 150 yr, the general topographic features have not been seriously disturbed. It is believed that the crater was caused by an air blast similar to Tunguska but of a much larger magnitude. It is therefore believed that there never was a significant raised rim. The nature of contour plowing would reduce any present rim by pulling the raised portion down into the crater.

The crater has an average diameter of 5400 ft at the 2950-ft elevation contour. The crater is elliptical with an eccentricity of approximately 0.71. It is oriented with the major axis at an azimuth of 45°.

The minimum age for this crater is approximately 3000 yr as determined by one ^{14}C sample [2]. This was probably a witnessed event as Pawnee Indian legends are rich in phenomena that may relate to this event.

In the area surrounding the crater for several kilometers are at least 12 secondary craters. Some of these have a diameter of 550 m. These are distinct from the eolian features by their circular shape and distribution from the primary crater.

A 6.8-kg (H4) chondrite was found in the proximity [3]. It has a specific gravity of 3.5. Several magnetic spherules of probable extraterrestrial origin and large quantities of glass flakes have been found in the crater area. Approximately 60 quartz grains were examined by polarizing microscope, and about half showed some shocking. There is an active search program for more meteorites in the area. A bore hole to search for breccia and shatter cones is planned.

The "IMPACT" software was developed to simulate and model this projectile using the "average" entry velocity of near-Earth asteroids (NEAs) of 21.8 km/s. The best solutions suggest an approximately 195-m-diameter NEA entering the atmosphere and creating an air blast at approximately 8 km altitude. The kinetic energy would have been equivalent to 180 megatons of TNT, of which approximately 50% would have been absorbed by the atmosphere [4,5].

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THE UPSILON PEGASID METEOR SHOWER.

H. Povenmire, Florida Institute of Technology, 215 Osage Drive, Indian Harbour Beach FL 32937, USA.

On the morning of August 8, 1975, meteors were observed from a previously unrecognized radiant in Pegasus. The rates were approximately 7 per hr [1]. The radiant was $\alpha = 350°$, $\delta = 19°$ (2000.0). These meteors are characterized as swift, yellow-white, and without significant ionization trains [1]. The average magnitude of several hundred meteors from this shower is approximately 3.50, slightly fainter than the Perseids, which occur at the same time. A broad maximum seems to occur about August 8.

The three active fireball networks (Prairie, MORP, and European) were contacted in a search for previously recorded fireballs, with negative results. Ceplecha [2] of the European Network computed the orbital elements using the FIRBAL program.

On August 19, 1982, at 02:09:57 UT, a magnitude –14.76 fireball occurred over the White Carpathian Mountains of Austria and Czechoslovakia. It was photographed by five cameras of the European Network. Reduction of this Upsilon Pegasid fireball (EN 190882A) showed it to be a type IIIb fireball [2], i.e., an extremely low-density, cometary, snowlike material with a specific gravity of approximately 0.27 g/cm^3. This material ablates at high altitude and cannot produce sonic phenomena or meteorites. It is similar to the material in the Draconid meteor shower. The orbital elements derived from EN 190882A are given in Table 1.

TABLE 1. Orbital elements for the Upsilon Pegasid stream from EN 190882A.

ω = 305.9009°	q = 0.2022
Ω = 145.3431°	e = 1.0
i = 85.0817°	velocity = 51.8608 km/s

Using these refined elements, Kronk [3] computed the radiant drift. The radiant drifts from the south-southwest to north-northeast at a relatively steep angle and at an average rate of 20 arcmin per day.

An intensive literature search [3] revealed four double-station Upsilon Pegasids that had previously been listed as sporadics. Institutions providing these data were Yale [4], Stalinabad [5], Tadjikistan [6], and Harvard [7]. These events showed a confirmed shower at least 20 days long.

The radiant appears to be approximately 3° in diameter. Computer modeling using the D criterion developed by Southworth and Hawkins [8] indicates that it could be much larger [3]. It is likely an old shower that is still intact, not disrupted by planetary perturbations due to its high inclination.

These meteors cross the Earth's orbit while approaching the Sun. They arrive at perihelion about September 16.0 at a perihelion distance of 0.19 AU, half that of Mercury's orbit. The Earth travels through this nearly vertically inclined stream in almost the shortest possible interval. A shower duration as noted indicates a diameter of approximately 0.6 AU.

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ELECTROPHONIC SOUND FROM THE DIAMOND LAKE, OREGON, FIREBALL.

R. N. Pugh, Cleveland High School, Portland OR 97202, USA.

At 9:16 p.m. PST, March 28, 1994, a large fireball exploded near Diamond Lake, in south central Oregon. The object was 5× the diameter of a full Moon, casting shadows along the flight path. There were numerous sonic booms near the end point of the fireball.

There were 15 reports of electrophonic sound. These sounds were heard as far away as 340 km. In most cases the observer was near metal objects such as fences or automobiles. There was one report of the fireball setting off a radar detector in an automobile. This occurred 270 km behind the fireball entry point in the atmosphere.

There were several reports of birds that stopped singing, coyotes that stopped howling, and dogs and cats running for cover.

ARE MAIN-BELT ASTEROIDS A SUFFICIENT SOURCE FOR THE EARTH APPROACHERS?

D. L. Rabinowitz and G. W. Wetherill, Department of Terrestrial Magnetism, Carnegie Institution of Washington, Washington DC, USA.

Until recently, only the orbit distribution of large Earth-approaching asteroids (diameter, $d \sim 1$ km) was known. Meteor orbits were known only from their atmospheric trajectories, and only for objects with $d < 1$ m. These