THE SERPENT MOUND, OHIO ASTROBLEME – NEW ACCESS – REFINED DATA. H. Povenmire, Florida Institute of Technology, 215 Osage Drive, Indian Harbour Beach FL 32937, USA.

In south central Ohio is an area of special interest. On Route 73 near the town of Sinking Spring is the Serpent Mound State Memorial. In this park is the largest effigy mound in the world. The mound is approximately 1345 feet in length. This mound was created by the Adena Indians about 1000 years ago.

Quite unknown to the Indians, an asteroid impacted the nearby area about 300 million years ago. There is an approximately 4 mile diameter astrobleme just slightly to the northeast of the Serpent Mound. This area is near where the three counties, Adams, Pike and Highland come together. This is found on the USGS 7.'5 Sinking Spring, and Byington, Ohio 1988 P.I. quadrangle topographic maps. The structure of the astrobleme is just barely visible on the topographic maps. The coordinates of the center of this astrobleme are approximately longitude 83° 24' 19.9" W. and latitude 39° 02' 01."0 N. The present elevation of the central uplift is 990' above sea level. In the stream beds out from the central uplift are vertical strata.

The major difficulty in the study of this structure was the lack of access to this area. In the summer, the forest is very dense and one could become hopelessly lost just a few feet off the highway. Also disease carrying ticks are very bad during the summer months.

Recently, a new access road has been built and it crosses the central uplift area. This county road called Parker Ridge Road allows access to nearly all parts of the structure. The central uplift is only several hundred feet across. The shatter cones are found near the top of the central uplift. Nearly any rock found near the central uplift will show the typical shatter cone structure when broken open. In the outlying areas around the edges of the astrobleme are spectacular uplifted areas in the limestone and shale. In certain places the county roads cut through these areas and one can see the changing uplift angles every 100 meters or so. At places, the uplifted strata are vertical.

This area has been known as a geological anomaly since about 1904. It was mapped by Walter H. Bucher of Columbia University in 1920 and there was some suspicion that it was an impact crater. Its structure was noticed to be similar to the Steinheim Basin. He made the off hand comment that this area seemed to resemble a lunar crater. Anomalies like these were referred to as crypto-volcanic structures even though there was no volcanic signature present. It was not until 1962 that Robert S. Dietz coined the term, "Astrobleme" which translates to "Star Wound." The finding of coesite and shatter cones confirms the structure to be an astrobleme (1).

I have made many field trips to the area to try to refine the diameter of this nearly circular structure. The figure of 6.473 km (21,100 ft) seems to be accurate. By using the Impact 4A software developed by Bradley Downs, an attempt is made to compute the mass of the impactor. This software computes four variables. These are the spherical diameter, the density, the velocity and the preatmospheric kinetic energy expressed in megatons of TNT. Since it is very likely that this was a near Earth asteroid (NEA) we assume that the velocity is the average NEA velocity of 22.0 km per second (13.64 MPS). Since there is no strong magnetic signature, we assume the asteroid was stony in composition. The average specific gravity for an H chondrite is approximately 3.7 g/cm3. The average for an L chondrite is approximately 3.45 g/cm3. For purposes of computations we will assume a specific gravity of 3.6 g/cm3. Using the formulas of Ralph Baldwin we assume that the meteoroid had a diameter of approximately 10% of the diameter of the crater or 2100 feet (680 m).

This gives a volume in cubic meters of 1.65 X 10 to the eighth power. The weight in kg is 5.93 X 10 to the eleventh power. The kinetic energy is equal to 34.18 gigatons of TNT. The resulting figures allow us to see what an incredible amount of energy is released in an asteroid impact.

If you want to visit this site, it is best to go in the winter months after the leaves have fallen. It is also wise to bring a topographic map and a compass.

References: [1] Dietz R. S. (1962) *Astroblemes Scientific American Aug. 1962,* pp. 50–58.