CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)

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Project Number

S0601

Project Title

Simulation of Terrestrial Impact Craters

Abstract

Objectives/Goals

Simulation of terrestrial impact craters will determine if the parameters of low velocity impact craters obey power laws and confirm or extend published impact crater data.

Methods/Materials

The experiment was conducted by dropping projectiles from carefully measured heights to a containment vessel, which was filled with sand whose surface was leveled before each drop. Projectiles were released one at a time. The drop time was measured. The impact was recorded using a digital video camera. After impact, the depth and diameter of the resulting crater was measured. Each of the projectiles was carefully weighed and its diameter was measured.

Results

The impact energy for each trial was calculated from the drop height, neglecting any air resistance or drag. Crater diameter and depth were plotted against the impact energy. This data was plotted on linear, semi-logarithmic, and log-log plots to determine the relationship between crater parameters and impact energy. The crater diameter data were fit very well to a power law. The results of our project both compliment and extend published data.

Conclusions/Discussion

Low velocity impact crater parameters can be described well by power laws. We used our power law fit to extrapolate our results to compare with real terrestrial impact events, and we found remarkably good agreement. The video recording, when viewed frame by frame, allowed us to see how craters formed, and how the ejecta wave propagated. Avenues for further study were also identified.

Summary Statement

Low velocity impact crater parameters were characterized by power laws, which allowed comparison with terrestrial impact craters.

Help Received

Supportive mentoring was provided by Dr. John C. Howe and Dr. Charles Barker. They also provided ongoing supervision to ensure that proper safety procedures were followed.