CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)

Jennifer A. Dick-Peddie

Project Number

38413

Project Title

The Effect of an Object's Velocity, Size, and Mass on the Diameter and Depth of Its Impact Crater

Abstract

Objectives/Goals

The objective of this study is to understand how the size, mass, and velocity of a meteor relates to the size of the crater it makes upon impact.

Methods/Materials

I used direct measurement, using a caliper, to identify the diameter and depth of impact craters made by objects of different size, mass, and velocity, after impacting a surface made of packed flour and topped with cocoa powder.

Materials included: Balls of different weights, sizes, and densities; box, flour, cocoa powder, tape measure, caliper, notebook, graph paper, hook and string, rod.

Results

Experiment #1: The larger and heavier object created a wider and deeper impact crater than a smaller object of the same density, traveling at the same speed and same drop height. Experiment #2: The heavier object of the same size created a deeper crater, on average, when dropped from the same height. Experiment #3: Objects traveling at higher velocity upon impact create wider and deeper craters than objects with lower velocity, everything else being equal.

Conclusions/Discussion

When a meteor strikes a planet, it will likely cause a crater at the impact site. The faster the object is moving, and the larger or heavier the object is, the greater the crater size will be. The velocity and the mass of the meteor are the greatest factors that predict impact crater size. I was happy to see the results of these experiments were consistent with the research findings, and support the hypothesis. Knowledge of this topic is important for scientists for many reasons, one of them is to understand impact size and be able to identify those space objects that are large enough to be a threat to Earth.

Summary Statement

This project demonstrated that objects with greater mass, higher velocity, and greater density will create wider and deeper impact craters than smaller and slower moving objects.

Help Received

My parents helped me set up the materials for the experiments, and took pictures during the process. I conducted all of the experiments and documented the results.