The Effect of Meteor Impact Location on the Energy Transmitted

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The Earth’s geological, evolutionary and biological history has been shaped by the collisions with celestial bodies such as asteroids and comets. Their contributions can also cause destruction, as in the case of Chicxulub impact, when dinosaurs and 75% of the species became extinct. Fortunately, such catastrophic events are rare. However, the less-damaging though still devastating impacts happen frequently, such as the Tunguska (1908) and Chelyabinsk (2013) events. Last year, a 10-15 m meteor traveling at ~61,000 km/hour collided with Moon. The purpose of this experiment was to study the variation in damage caused by a meteor when it hits different topographies on Earth. Our planet is unique because it is enveloped by air and most of its surface is covered with dense water. The levels of independent variable were the impact on terrestrial, aquatic and semi-aquatic locations. The amount of energy dissipated after impact was the dependent variable. The terrestrial impact was the control. Three software simulations were conducted as a part of this experiment. In the first simulation, an impactor was modeled on the published parameters of the Chicxulub impactor. The second simulation studied the wave propagation around the globe, and the third one analyzed the impact craters. The results supported the hypothesis that of the three terrains, the impact on an aquatic location had the greatest energy dissipation and therefore the least damage. Future work could be extended to the refinement of the modeling algorithms and comparing different algorithms.

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