



Dear Students:

Welcome to the Deep Impact Mission Team! We are hoping to make a hole in a comet and we need your help. We would like to make a crater the size of a football stadium and 7-15 stories deep in Comet Tempel 1 when it swings past the Sun in July of 2005. In metric measurements, this comes out to around 200 meters across and 50 meters deep. The question is: how do we make a crater of these dimensions? We would like to find out what you think about how we should solve this problem.

We can see examples of cratering all over the Solar System. We can examine craters in other places and craters on the Earth and in laboratory tests and understand many things about how cratering works. However, there are a lot of things about cratering that we are just discovering. Over the next few weeks, you and your classmates will be examining what factors influence crater size, developing a model to help you determine how to make a crater of a particular size, and preparing a report passing on your findings and recommendations to us.

Why do we want to make a crater in a comet? Comets can tell us more about the formation of the Solar System. Comets are small chunks of ice and dust from the solar nebula, the cloud of gas and dust from which our Solar System formed. Objects like the Earth, the other planets, and their moons also formed from the solar nebula; however, their atmospheres, internal heat, and other forces have caused the composition and appearance of these larger objects to change over time. Comets, however, are frozen bits of that original material that have been sitting at the edges of the Solar System like time capsules since the Solar System began. Looking at comets can tell us what the early solar nebula was made of and help us develop a better picture of how the Solar System formed.

We have some idea of what comets are made of because we are able to study the sunlight reflected from the comet from observatories on Earth and with space telescopes. However, comets heat up as they get closer to the Sun and cool as they move back out to the edges of the Solar System. Some of the material streams away as part of the comet's tail. This means that the outer layers of the comets may have changed over time. What Deep Impact will do is allow us to see inside the comet, to the layers that have not been affected by the comet's travel.

We only get a look inside our time capsule if we can successfully make a large enough crater in the comet. Our team members at the University of Maryland, Ball Aerospace in Colorado, NASA Jet Propulsion Laboratory in California and other institutions around the country will be focusing on how to make this happen as we prepare for the launch of the mission in January 2005. We are interested to see what you and your classmates think about how we can make this crater. Thank you for lending your energy and your minds to this effort!

Sincerely,

Michael F. A'Hearn  
Principal Investigator  
Deep Impact Mission  
University of Maryland