The Deep Impact Mission

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This talk will discuss a new NASA mission to a comet in the context of how comets contribute to our understanding of the processes that were occurring in the early solar system 4.5 billion years ago. Comets are the archaeological remnants of this early era, and give us clues about the primordial chemical and physical conditions at that time. The talk will begin with a brief discussion of comet history, comet physics and how we use them to understand the early solar system, and then will highlight the most recently approved mission to a comet.

The eighth Discovery mission, Deep Impact, will be launched on 6 Jan 2004, for an encounter with comet P/Tempel 1 on 4 Jul 2005. The spacecraft will deliver a half ton copper impactor to the nucleus to excavate a crater >20m deep and >100m in diameter. This will be the first experiment to sample deeply below the surface of a comet, an object thought to be a primordial remnant from the epoch of solar system formation. We will also be examining the mechanics and energies of impact crater formation - a phenomenon which has played a large role in the development of life on Earth, as well as for mass extinctions of life on Earth (e.g. the KT impact 65 million years ago which was believed to be the cause of the extinction of the dinosaurs). Chemical evidence from Earth’s atmosphere and the study of comet composition will be shown to give clues about the origin of our atmosphere, and its evolution during the early Earth as life was developing. Recent discoveries of complex organics (fullerenes) which have survived impact on Earth in meteorites have shown too, that organic material can be transported to Earth via impact - and this has implications for the transport of pre-biotic material to Earth.

This mission will have wide public appeal, especially in light of recent media (movie) attention to space topics. A brief analysis of the scientific accuracy of the portrayal of impact events as seen in the movies Deep Impact and Armageddon will also be presented. Finally, because of the public appeal of this mission, I will briefly discuss plans for outreach associated with the mission, as well as an excellent ongoing summer Teacher Enhancement program on the theme of “Toward Other Planetary Systems” which supports local and US-Pacific affiliated teachers and students. Information on this program may be found at: http://www.ifa.hawaii.edu/tops. The Deep Impact mission web page is at http://www.ss.astro.umd.edu/deepimpact/