



## Latest News

September 12, 2005  
Volume 83, Number 37  
p. 12

### SPACE SCIENCE

# An Icy Dust Ball In Outer Space

## Lots of organics seen in first results from comet impact mission

[Elizabeth Wilson](#)

The deep impact spacecraft sends back this report of conditions on comet Tempel 1: lots of dust, heavy on the organics.

Two months ago, after a six-month journey to Tempel 1, the [National Aeronautics & Space Administration's Deep Impact](#) vehicle released an "impactor" containing a 317-lb chunk of copper. The object slammed into the comet, spewing out a brilliant blast of debris. Images of the event were captured not only by *Deep Impact* but by telescopes on Earth and in space (*Science*, published online Sept. 8, [dx.doi.org/10.1126/science.1118923](http://dx.doi.org/10.1126/science.1118923)).

At a press conference last week, scientists unveiled the first findings from the mission but would not speculate on what the results suggest about comets' formation and role in the solar system.

Because there's no evidence that the impactor plowed through a dusty surface into a firmer solid, it's possible that the comet is entirely made up of loose aggregates of dust, said [Michael F. A'Hearn](#), the mission's principal investigator, at the conference.

"I'm not convinced that there is a solid layer under there," said A'Hearn, an astronomy professor at the University of Maryland. "The outer tens of meters of cometary material are unbelievably fragile. It's less strong than a snowbank."

Although the crater remains obscured by dust, scientists believe it could be as large as a football field.

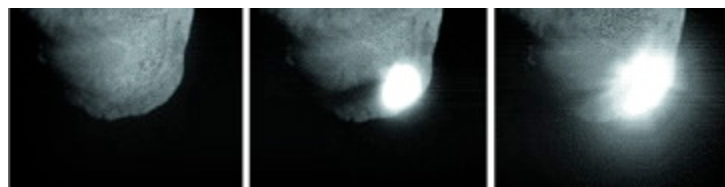
The findings have implications for the [European Space Agency's](#) Rosetta spacecraft, which is carrying a lander to the comet Wirtanen. If Tempel 1 is representative of other comets, "that would mean we can't really land on the surface because [the lander] would just sink into it," said Horst Uwe Keller, of the [Max Planck Institute for Solar System Research](#) in Katlenburg-Lindau, Germany.

In addition to water and CO<sub>2</sub>, *Deep Impact* detected unexpectedly high levels of organic compounds after the blast. This strengthens the hypothesis that comets may have seeded the early Earth with organic molecules.

Emission spectra reveal a line that represents a C-H bond stretch that's common to a number of organic molecules, including methanol and formaldehyde. But scientists haven't yet been able to identify many of the features because of the spectra's relatively low resolution.

They have seen evidence for HCN, as well as a blend of acetylene, ammonia, and HCN. Most intriguing, though, is a strong signature of acetonitrile--stronger than what has been detected on other comets. The acetonitrile levels "are a surprise," A'Hearn remarked.

*Deep Impact* and some telescopes also recorded six small outbursts of debris from the comet, unrelated to the impact. The outbursts are likely generated when the sun warms patches of the comet, causing a sudden outgassing of material.



SCIENCE © 2005

**COMET BLAST** A sequence of images taken by Deep Impact's high-resolution instrument shows the development of a cloud of ejected material.

Chemical & Engineering News  
ISSN 0009-2347  
Copyright © 2005