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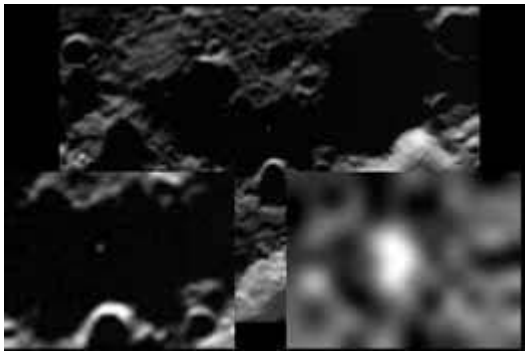
# Moon smash gives off flash

Early observations show no debris plume in the search for ice.

Eric Hand

For many astronomers, NASA's frontal assault on the Moon ended in a fizzle on Friday. The Lunar Crater Remote Observation and Sensing Satellite (LCROSS) crashed near the lunar south pole as planned, but an expected plume of bright debris was nowhere to be seen.



A sodium flash as observed by the mid-infrared camera on LCROSS (detail, lower left; extreme detail, lower right).NASA

However, mission scientists said they did spy a thermal flash and spotted a crater, perhaps 20 metres wide, created by the impact. They were most excited about a tiny bump in brightness seen by a mission spectrometer, which could signal the presence of water that some think exists as ice in the bottom of the target crater.

"When I saw the spectra I said, 'Hey, we got something here'," said Anthony Colaprete, LCROSS's principal investigator, at a press conference a few hours after the impact.

The mission consisted of two parts: the empty 2,300-kilogram upper stage of an Atlas V Centaur rocket and a 'shepherding spacecraft', loaded with cameras and sensors, that followed four minutes behind the Centaur stage on its crash course.

The target was Cabeus, a crater hoped to be rich in ice kept in deep freeze in the crater's permanent shadows. Two weeks ago, Colaprete made a last-minute switch to target Cabeus after the sister mission to LCROSS, the Lunar Reconnaissance Orbiter (LRO), began to find evidence of increased hydrogen within the crater (see 'Target crater changed for Moon crash').

The impact sequence was followed not only by telescopic eyes in space, such as LRO and the Hubble Space Telescope, but also by hundreds of telescopes, both professional and amateur, in North America, where the skies were mostly clear. But no observers, not even at the 10-metre

telescopes at the W. M. Keck Observatory in Hawaii, immediately reported seeing a debris plume.

Colaprete said the apparent lack of a plume could say something about the angle at which LCROSS struck the surface or the stiffness of the material at the surface, which could have been soft lunar soil or hard bedrock. But, he said, LCROSS definitely hit something. "We saw a crater, we saw a flash, so something had to happen in between," he said. "I'm not convinced we haven't seen the ejecta."

In Washington DC, several hundred people — a mix of NASA employees, staffers from the US Congress and parents with children — gathered in the atrium of the Newseum to watch a live feed of the impact on a 10-metre-wide screen. Apollo 11 astronaut Buzz Aldrin sat quietly while a boy dressed in an orange NASA jumpsuit folded his programme, titled 'Let's Kick Up Some Moon Dust', into a paper aeroplane. NASA administrator Charles Bolden grabbed a cup of coffee and went up to the balcony to get a better view of the screen.

As the moment of impact approached, the crowd became silent, unsure of where to look or what to look for. The screen flashed white for a moment and then cut to a pixelated colour view from an infrared camera. "Good stuff," said Bolden, though he wasn't quite sure what he had seen. Maybe he saw the impact in the infrared image? "There was a big red spot," he said.

And with that, the LCROSS party was over. The crowd applauded and slowly filed out. Bolden was asked if it was important for successful science missions to have a dramatic component to them. "We need to prepare the public for what to expect," he said. "It's all about managing expectations."