

# Twin NASA spacecraft deliberately crash into moon

17 December 2012, by Alicia Chang



An artist's depiction of the twin spacecraft (Ebb and Flow) that comprise NASA's Gravity Recovery And Interior Laboratory (GRAIL) mission. Credit: NASA/JPL-Caltech/MIT

A pair of NASA spacecraft tumbled out of orbit around the moon and crashed back-to-back into the surface on Monday, ending a mission that peered into the lunar interior.

Engineers commanded the twin spacecraft, Ebb and Flow, to fire their engines and burn their remaining fuel. Ebb plunged first, slamming into a mountain near the moon's north pole. Its twin, Flow, followed about a half minute later and aimed for the same target.

By design, the final resting place was far away from the Apollo landing sites and other historical spots on the moon.

After the double impacts, mission chief scientist Maria Zuber of the Massachusetts Institute of Technology said the spot has been named after team member Sally Ride, the first American

woman in space, who died earlier this year.

"It's really cool to know that when you look up now at the moon there's this little corner of the moon that's named after Sally," said Ride's sister, Rev. Bear Ride, adding that she hoped schoolchildren will be inspired.

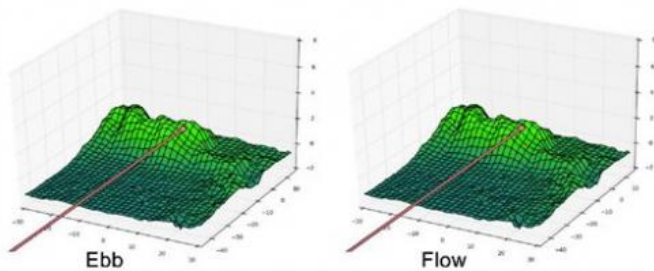
Since the crash site was in darkness, the final act was not visible from Earth. The Lunar Reconnaissance Orbiter circling the moon will pass over the mountain and attempt to photograph the skid marks left by the washing machine sized-spacecraft as they hit the surface at 3,800 mph.

After rocketing off the launch pad in September 2011, Ebb and Flow took a roundabout journey to the moon, arriving over the New Year's holiday on a gravity-mapping mission.

More than 100 missions have been flung to Earth's nearest neighbor since the dawn of the Space Age including NASA's six Apollo moon landings that put 12 astronauts on the surface.

The demise of Ebb and Flow comes on the same month as the 40th launch anniversary of Apollo 17, the last manned mission to the moon.

Ebb and Flow focused exclusively on measuring the moon's lumpy gravity field in a bid to learn more about its interior and early history. After flying in formation for months, they produced the most detailed gravity maps of any body in the solar system.



This graphic provide by NASA shows the projected paths into the moon by spacecraft Ebb and Flow. The twin craft on Monday, Dec. 17, 2012, is expected to slam into a lunar mountain near the north pole after nearly a year in orbit. (AP Photo/NASA)

at the NASA Jet Propulsion Laboratory applauded when controllers lost signal from the spacecraft.

The last time the space agency intentionally fired manmade objects at the moon was in 2009, but it was for the sake of science. The crash was a public relations dud—spectators barely saw a faint flash—but the experiment proved that the moon contained water.

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Secrets long held by the moon are spilling out. Ebb and Flow discovered that the lunar crust is much thinner than scientists had imagined. And it was severely battered by asteroids and comets in the early years of the solar system—more than previously realized.

Data so far also appeared to quash the theory that Earth once had two moons that collided and melded into the one we see today.

Besides a scientific return, the mission allowed students to take their own pictures of craters and other lunar features as part of collaboration with a science education company founded by Ride, who died in July of pancreatic cancer at age 61.

Scientists expect to sift through data from the \$487 million mission for years.

Obtaining precise gravity calculations required the twins to circle low over the moon, which consumes a lot of fuel. During the primary mission, they flew about 35 miles above the lunar surface. After getting bonus data-collecting time, they lowered their altitude to 14 miles (22 kilometers) above the surface.

With their fuel tanks almost on empty, NASA devised a controlled crash to avoid contacting any of the treasured sites on the moon. Mission control

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