

Spacecraft Could Save Earth from Asteroids

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Asteroid (2867) Steins. Image: ESA

(PhysOrg.com) -- British space engineers working for a space company in Stevenage in England, have designed a "gravity tractor" spacecraft to deflect any asteroids threatening to collide with Earth. The announcement comes only weeks after an asteroid collision scar around the size of Earth was detected on Jupiter.

A collision with an [asteroid](#) is a rare event, but scientists believe it is inevitable that sooner or later an asteroid will come close enough to be a real threat. In fact in 2004 an asteroid called Apophis caused alarm when scientists predicted there was a 1:37 chance of it hitting Earth in 2029, which is the greatest threat in recorded history. They later revised their figures but it could still be on course to collide in 2036. The US space

agency, [NASA](#) estimates there are at least 1000 "potentially hazardous asteroids."

NASA is so concerned about the threat it has set up a monitoring program to track every space object that could be an asteroid on a collision course. They are so far tracking over 6,000 asteroids whose orbits bring them close to Earth, but there are an estimated 100,000 asteroids large enough to wipe out a city.

A collision could be catastrophic, depending on how large the asteroid is and where it hits. A direct hit to a city by even a relatively small asteroid the size of a football field, for example, could completely destroy the city and kill millions of people. Many more could be killed by tsunamis triggered by the impact, and by dust and burning material thrown up into the atmosphere after the collision.

The engineers, led by Dr Ralph Cordey, head of exploration and business at EADS Astrium, a British space company, have designed what they call a "gravity tractor", a ten-tonne spacecraft around 100 feet long that could provide a practical way of averting a collision with Earth.

The device would be launched as soon as an asteroid was found to be on course to crash into the planet, and would fly alongside it at a distance of about 160 feet away. The craft could divert an asteroid up to 430 yards in diameter, and an impact with an asteroid this size would release around 100,000 times the energy of the bomb dropped on Hiroshima in 1945.

The gravity tractor is designed to draw the asteroid towards itself by exerting a small gravitational force on it. The spacecraft would then steer the asteroid away into an orbit away from Earth.

The craft would use four ion thrusters, which are low energy and

efficient, of the type commonly used on deep space probes. The ion thrusters enable the craft to adjust its position relative to the asteroid. The gravitational pull exerted by the asteroid would be enough to nudge the rock into a different, and less dangerous, trajectory.

The process of steering the asteroid away from a collision course would take several years, with the craft changing the angle of trajectory by only a fraction of an inch over 15 years, but that is enough change to divert an asteroid. The spacecraft would need to be launched at least 15 (preferably 20) years before the predicted collision to give it time to adjust the asteroid's trajectory away from Earth.

The design team say the gravity tractor could be built fairly quickly with existing technologies, although a prototype has not yet been built. They have planned the details of the mission, and expect the cost could be shared by a number of governments if an asteroid on track to hit Earth was discovered, and international agreements would need to be drawn up.

NASA published a paper earlier this year on the feasibility of using a gravity tractor for this purpose, and they concluded it could be extremely effective if there was enough warning. With scientists saying the asteroid Apophis could possibly be on a course to collide with [Earth](#) in 2036, perhaps we do have enough warning.

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