ASTEROID DAY 2017 WAS ON JUNE 30

Asteroids pose a threat to Earth, but they also represent untapped resources.

The third annual International Asteroid Day was on June 30, 2017. According to its organizers, Asteroid Day is a global awareness campaign to help people learn about asteroids and about what we can do to protect our planet from asteroid impacts.

Asteroid Day is held on the anniversary of the largest asteroid impact in Earth's recent history – an event that took place in Siberia on June 30, 1908, known as the Tunguska explosion. (See below)

As a small asteroid exploded over Tunguska, Siberia, it released the equivalent of 100 tons of TNT, devastating an area of about 2,000 square km, the size of a major metropolitan city.

NASA's portion of Asteroid Day 2017 started at 16:00 UTC on Friday, June 30. Its program featured information on how researchers find, track and characterize NEOs – Near Earth Objects, asteroids and comets that come within the vicinity of Earth's orbit and could pose an impact hazard to Earth – and how NASA is working to get our nation prepared to respond to a potential impact threat.

An object entered the atmosphere over the Urals early in the morning of February 15, 2013.

NASA Planetary Defence Officer **Lindley Johnson** said in a statement:

> *At NASA, every day is an asteroid day, but we value the international collaboration for a designated day to call attention to the importance of detecting and tracking hazardous asteroids.*

NASA put together 10 cool facts about asteroids:

Astrophysicist and guitarist **Brian May** is a co-founder of Asteroid Day.

1. Asteroids were named by British astronomer **William Herschel** from the Greek expression meaning "star-like". Over 1 million asteroids larger than 1 kilometre are in the Main Belt between the orbits of Mars and Jupiter. And there are millions more smaller in size, from Vesta – at about 529 km – to just a few feet across.
2. Asteroids are generally categorized into three types: carbon-rich, silicate, or metallic, or some combination of the three.
3. If all of the asteroids were combined into a ball, they would still be smaller than Earth's Moon.
4. Except for a big one: In 1801, **Giuseppe Piazzi** discovered the first and largest asteroid, Ceres, orbiting between Mars and Jupiter. Today, it's classified as a dwarf planet.
5. NASA's Psyche mission will launch in 2022 to explore the all-metal asteroid. And in October 2021, the Lucy mission will be the first to visit Jupiter's swarms of Trojan asteroids.
6. A Near-Earth Asteroids is an asteroid that comes within 44 million km of Earth's orbit. As of June 19, 2017, there are 16,209 known near-Earth asteroids, with 1,803 classified as potentially hazardous that could someday pose a threat to Earth.
7. About once a year, a car-sized asteroid hits Earth's atmosphere, creates an impressive fireball, and burns up before reaching the surface.
8. Ground-based observatories and facilities such Pan-STARRS, the Catalina Sky Survey, and ATLAS are constantly on the hunt to detect near-Earth asteroids. NASA also has a small infrared observatory in orbit about the Earth: NEOWISE.
9. The first discovery of an asteroid-moon system was of asteroid Ida and its moon Dactyl in 1993.
10. Several NASA space missions have flown and observed asteroids. The NEAR Shoemaker mission landed on asteroid Eros in 2001 and NASA's Dawn mission was the first mission to orbit an asteroid in 2011. In 2005, the Japanese spacecraft Hayabusa landed on asteroid Itokawa. Currently, NASA's OSIRIS-REx is en route to a near-Earth asteroid called Bennu.

June 30, 1908 In a remote part of Russia, a fireball was seen streaking across the daytime sky. Within moments, something exploded in the atmosphere above Siberia's Podkamennaya Tunguska River in what is now Krasnoyarsk Krai, Russia.

This event – now widely known as the Tunguska event – is believed to have been caused by an incoming asteroid (or comet), which never actually struck Earth but instead exploded in the atmosphere, causing what is known as an air burst, 5–10 kilometres above Earth's surface. The explosion released enough energy to kill reindeer and flatten trees for many kilometers around the blast site. But no crater was ever found.

Fallen trees at Tunguska. This image is from 1927, when Russian scientists were finally able to get to the scene. Photograph from the Soviet Academy of Science 1927 expedition led by Leonid Kulik.

At the time, it was difficult to reach this remote part of Siberia. It wasn't until 1927 that **Leonid Kulik** led the first Soviet research expedition to investigate the Tunguska event. He made a initial trip to the region, interviewed local witnesses and explored the region where the trees had been felled. He became convinced that they were all turned with their roots to the centre. He did not find any meteorite fragments, and he did not find a meteorite crater.

Map of the approximate location of the Tunguska event of 1908.

Over the years, scientists and others concocted fabulous explanations for the Tunguska explosion. Some were pretty wild – such as the encounter of Earth with an alien spacecraft, or a mini-black-hole, or a particle of antimatter.

The truth is much more ordinary. In all likelihood, a small icy comet or stony asteroid collided with Earth's atmosphere on June 30, 1908. If it were an asteroid, it might have been about a third as big as a football field – moving at about 15 kilometres per second.

Because the explosion took place so long ago, we might never know for certain whether it was an asteroid or comet. But in recent decades astronomers have come to take the possibility of comet and asteroid impacts more seriously. They now have regular observing programs to watch for Near-Earth Objects, as they're called. They also meet regularly to discuss what might happen if we did find an object on a collision course with Earth.

Illustration of an asteroid passing near the Earth. NASA.

Apart from being a threat to our existence, asteroids are also considered a source of raw material for industry sometime in the future. Minerals and volatiles could be mined from an asteroid or spent comet, then used in space for in-situ utilization (e.g. construction materials and rocket propellant) or taken back to Earth. **These include gold, iridium, silver, osmium, palladium, platinum, rhenium, rhodium, ruthenium and tungsten** for transport back to Earth; **iron, cobalt, manganese, molybdenum, nickel, aluminium, and titanium** for construction; **water and oxygen** to sustain astronauts; as well as **hydrogen, ammonia, and oxygen** for use as rocket propellant. Due to the present high launch and transportation costs of spaceflight, terrestrial mining remains the only means of these raw mineral acquisition today. This situation is likely to change in the future as resources on Earth are becoming increasingly scarce and the full potentials of asteroid mining are researched in greater detail. However, it is uncertain whether the cost of asteroid mining will ever develop to a point where it becomes practical.

AK, with EarthSky and Wikipedia Notes