

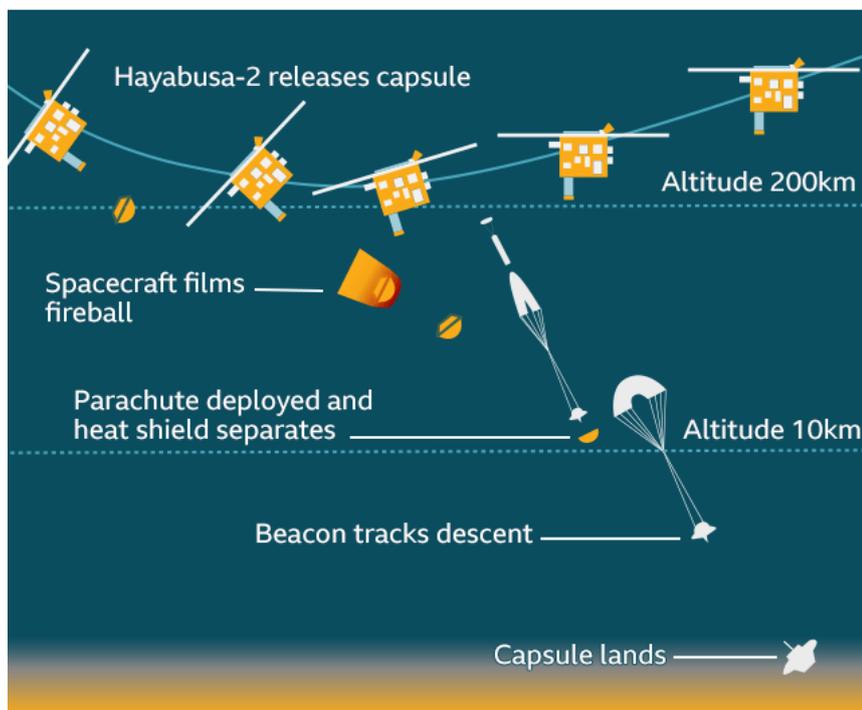


Dust Samples from Hayabusa 2

Why in News

Recently, **Japan Aerospace Exploration Agency (JAXA)** has received a capsule from the **unmanned Hayabusa 2**, carrying the **first extensive samples of dust** from the **asteroid Ryugu**.

// Hayabusa-2 capsule to return to Earth



Key Points

- Hayabusa 2 was launched from **Japan's Tanegashima space centre in 2014** and took **four years to reach** the asteroid Ryugu.
 - The mission builds on the **original Hayabusa mission** that was launched in **2003** and successfully linked up with **asteroid Itokawa in 2005**.
 - It **returned samples to Earth in 2010** marking the **first time when sample materials** from an asteroid were brought back to Earth.
 - Hayabusa is the Japanese term used for the **peregrine falcon**, which is the **fastest bird during its hunting dive** (200 mile per hour).
- The space probe **orbited above the asteroid for a few months to map its surface** before landing. Then it used **small explosives to blast a crater, collected the resulting debris** and headed back to Earth in November 2019.
- The craft's mission **seeks to answer some fundamental questions** about the **origins of the**

[Solar system](#) and **where molecules like water came from.**

▪ **Significance:**

- Asteroids and [comets](#) are **primitive bodies** that can be considered to be the **building blocks of the early Solar system** and they hold a **record of the birth and initial evolution.**
- **Larger planets** like Earth went through a **more complex evolution over which the pristine materials were melted and altered significantly.** Due to this change, the materials found on large planets **do not hold information into their early stages of formation.**
- Asteroids and **comets** retain a record of when, where and in what conditions they were formed. Exploration of these primitive bodies is **essential in gaining insight into the formation of the Solar system.**
 - **Gases trapped** in the rock samples could **reveal more about the chemical mixture** from the planets formed.
- Significantly, among all the **reasons that will eventually cause the extinction of life on Earth,** an **asteroid hit** is widely acknowledged as one of the likeliest.

Asteroids

- Asteroids are also known as **minor planets** and are made up of **metals and rocks.**
- They **orbit the Sun** and have **shorter and elliptical orbits.**
- Most asteroids are **irregularly shaped,** though a **few are nearly spherical.**
- Many asteroids are known to have a **small companion moon** (some have two moons).
- There are also **binary** (double) **asteroids,** in which two rocky bodies of roughly equal size orbit each other, as well as **triple asteroid systems.**
- **Classification of Asteroids:**
 - **Main Asteroid Belt:** The majority of known asteroids orbit within the asteroid belt which is a torus-shaped region in the Solar system, located roughly **between the orbits of the planets Mars and Jupiter.**
 - **Trojans:** These asteroids **share an orbit with a larger planet,** but do not collide with it because they gather around two special places in the orbit (called the **L4 and L5 Lagrangian points**). There, the gravitational pull from the sun and the planet are balanced.
 - **Lagrange Points:** These are positions in space where the **gravitational forces of a two body system** like the Sun and the Earth produce **enhanced regions of attraction and repulsion.** These can be used by spacecraft to reduce fuel consumption needed to remain in position.
 - **Near-Earth Asteroids:** These objects have orbits that **pass close by that of Earth.** Asteroids that actually cross Earth's orbital path are known as **Earth-crossers.**

[Source: IE](#)