

SAMPLING OF ASTEROIDS

What are asteroids?

Asteroids are the bits and pieces left over from the processes that formed the planets in our solar system, including the Earth. They are rocky objects, and some with strange irregular shapes. The biggest are up to hundreds of kilometres across, but most are much smaller.

Primitive asteroids, in contrary to *evolved* asteroids, have not undergone any melting or differentiation since their formation.



Itokawa - a primitive asteroid



Meteorites - nature's own way of sampling asteroids

How can we study asteroids?

Asteroids are important because they tell us about the earliest processes in our solar system. One way of studying asteroids is to look at meteorites. Most meteorites we have here on Earth are samples of asteroids.

Asteroids can also be studied by remote space exploration, but this can only allow us to study the surfaces of asteroids. The ESA (European Space Agency) Rosetta mission, made a flyby of the asteroid Lutetia in 2010 and is hoping to flyby a comet in 2014.

Extraterrestrial Sample Return

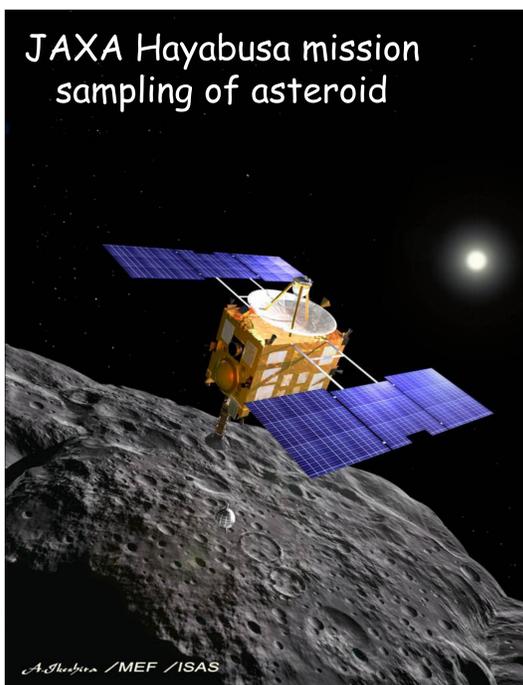
Until now, extraterrestrial samples have successfully been returned to the Earth by human or robotic space exploration from:

- 1) the Moon - the NASA Apollo manned missions in the 1960's
- 2) the comet "81P/Wild" - NASA Stardust mission launched 1999 - returned 2006
- 3) the asteroid "Itokawa" - JAXA Hayabusa mission launched 2003 - returned 2010



NASA Stardust mission - collecting dust from a comet

JAXA Hayabusa mission sampling of asteroid



Sample return of Asteroids

Many meteorites are samples of asteroids, but we do not know exactly from which asteroid, and where within/on the asteroid the meteorites come from. However, by collecting and returning samples of asteroids ourselves, with the help of modern robotic technology, we will know exactly where the samples come from.

NASA (USA), ESA (Europe) and JAXA (Japan) are now in the process of planning future sample return missions to asteroids: the NASA OSIRIS REx mission is to be launched in 2016, and the ESA Marco Polo-R and JAXA Hayabusa2 missions are to be launched sometime in 2020's.