

Rosetta - The Mission

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Rosetta Steins fly-by Press Conference
Darmstadt, ESA/ESOC, 6 September 2008

ROSETTA, an overview

- Rosetta is an ESA scientific cornerstone mission
- Initially studied as an ESA/NASA comet-nucleus sample return mission, it later became a European-only mission (with 3 NASA instruments) to perform in-situ measurements at the comet
- Rosetta was endorsed by ESA in 1993 and launched in 2004
- 67/P Churyumov-Gerasimenko is the final target comet, to be reached in 2014
- A very precise injection into interplanetary orbit by Ariane 5 allowed Rosetta to have enough fuel for two asteroid encounters on the way:
 - (2867) Steins, 2008
 - (21) Lutetia, 2010
- The fly-by of asteroid Steins is the first nominal science phase of the mission

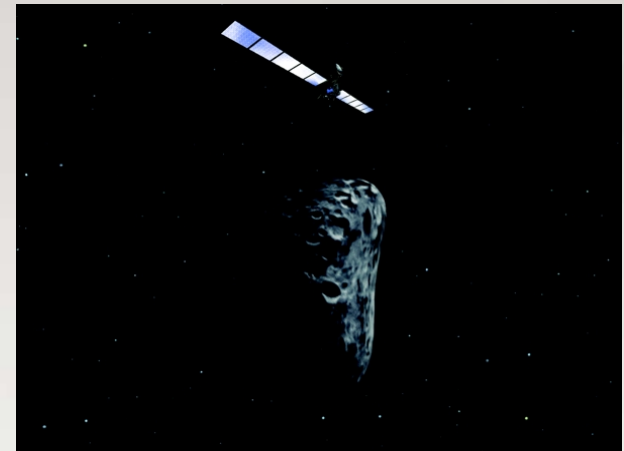
ROSETTA's firsts

- Rosetta will be the first mission to rendezvous with a comet nucleus and orbit it for an extended period
- Rosetta will be the first mission to deploy a lander (Philae) onto the surface of a comet nucleus.



ROSETTA's objectives

- Bringing a lab to a comet!
 - determine the physical properties and the chemical composition of a comet by in-situ investigations
- Study the evolution of the cometary phenomena (coma and tail) while the comet approaches the Sun
- Observe at least one asteroid from close by, so to study another class of primitive members of the solar system to understand better how it was formed

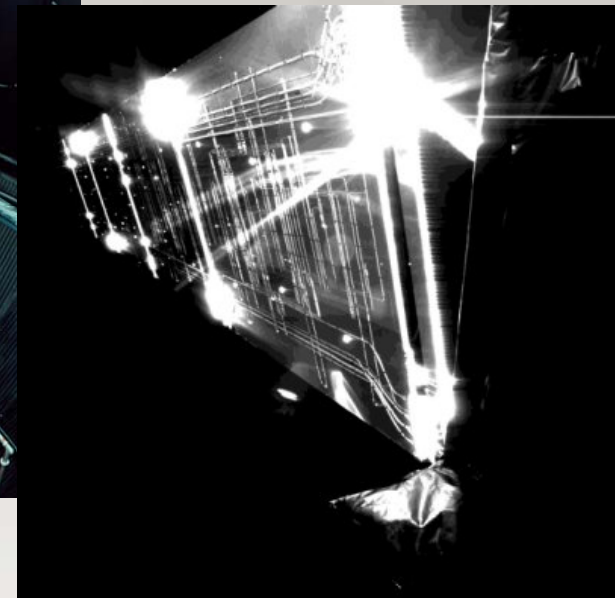
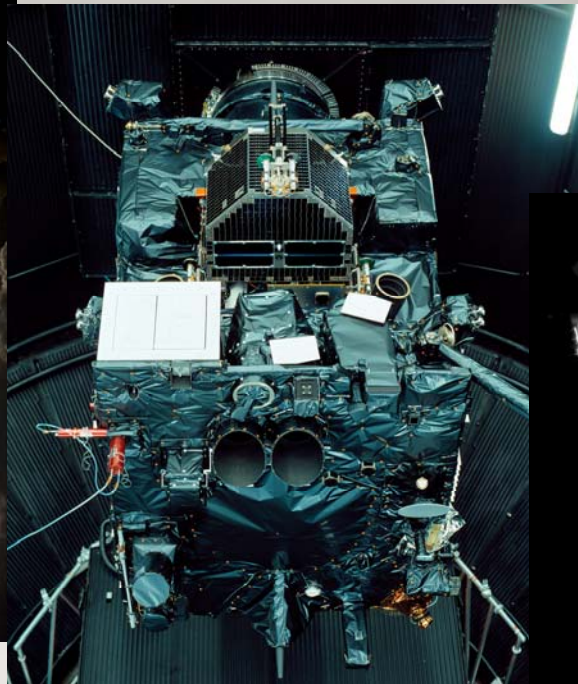


ROSETTA's journey to 67P/Churyumov-Gerasimenko

- Launch (2 March 2004, from Kourou, French Guyana)
 - Deep-space Manoeuvre, 1st Earth swing-by (4 Mar 2005)
 - Deep-space Manoeuvre, Mars swing-by (25 Feb 2007)
 - 2nd Earth swing-by (13 Nov 2007)
 - Steins fly-by (5 Sept 2008) – 800 km distance, 5 km diameter
 - Deep-space Manoeuvre, 3rd Earth swing-by (13 Nov 2009)
 - Lutetia fly-by (10 Jun 2010) – 3000 km distance, 100 km diameter
 - Deep-space Manoeuvre & start of hibernation (mid-2011) – within 4.5 AU from Sun
 - Exit from hibernation and Deep-space Manoeuvre (Early 2014) →
→ **prime science mission begins**
 - Comet Rendezvous (Spring 2014) – between 4.5 AU and 4 AU from Sun
 - Philae lander deployment (Nov 2014) – 3.25 to 3 AU from Sun
 - Comet closest approach to the Sun (Aug 2015)
 - End of Mission (31 Dec 2015)
- (1 AU = 150 million km)

Launch and Commissioning

Ariane 5 Launch, 2 March 2004



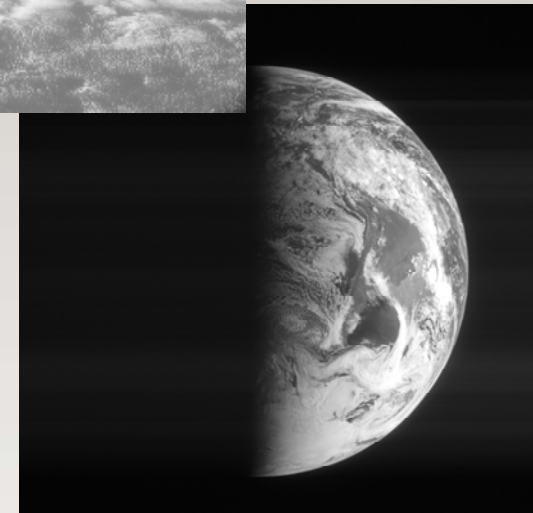
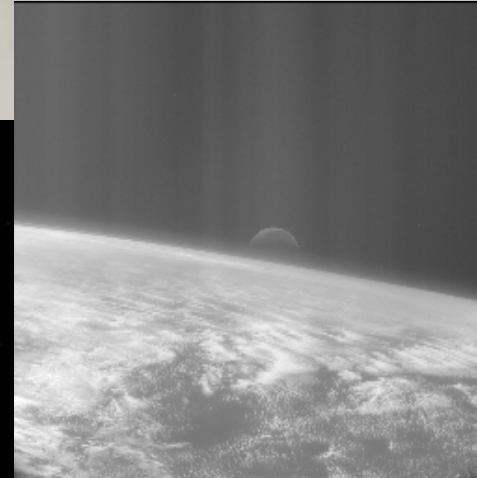
Commissioning was completed
mid-October 2004:

instrument software
update and functional checks

Solar Arrays as seen from
lander, April 2004

First Earth swing-by (gravity assist)

04 March 2005 at 1900 km altitude
In-flight validation of Asteroid Flyby Mode



Navigation Camera
March 2005

Mars swing-by (gravity assist)



Mars and Rosetta's solar arrays as seen from Philae (CIVA camera), 25 February 2007

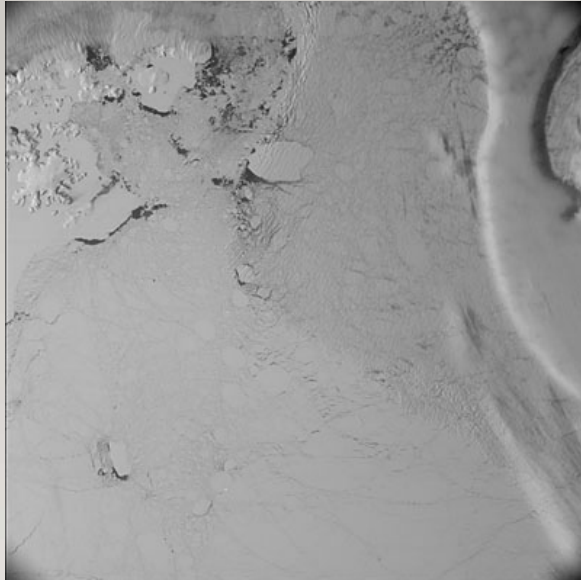
25 February 2007
at 250 km altitude



Mars in true colours as seen by the OSIRIS camera, 24 February 2007

Second Earth swing-by (gravity assist)

13 November 2007 at 5301 km altitude



Earth - Antarctica,
navigation camera,
13 November 2007



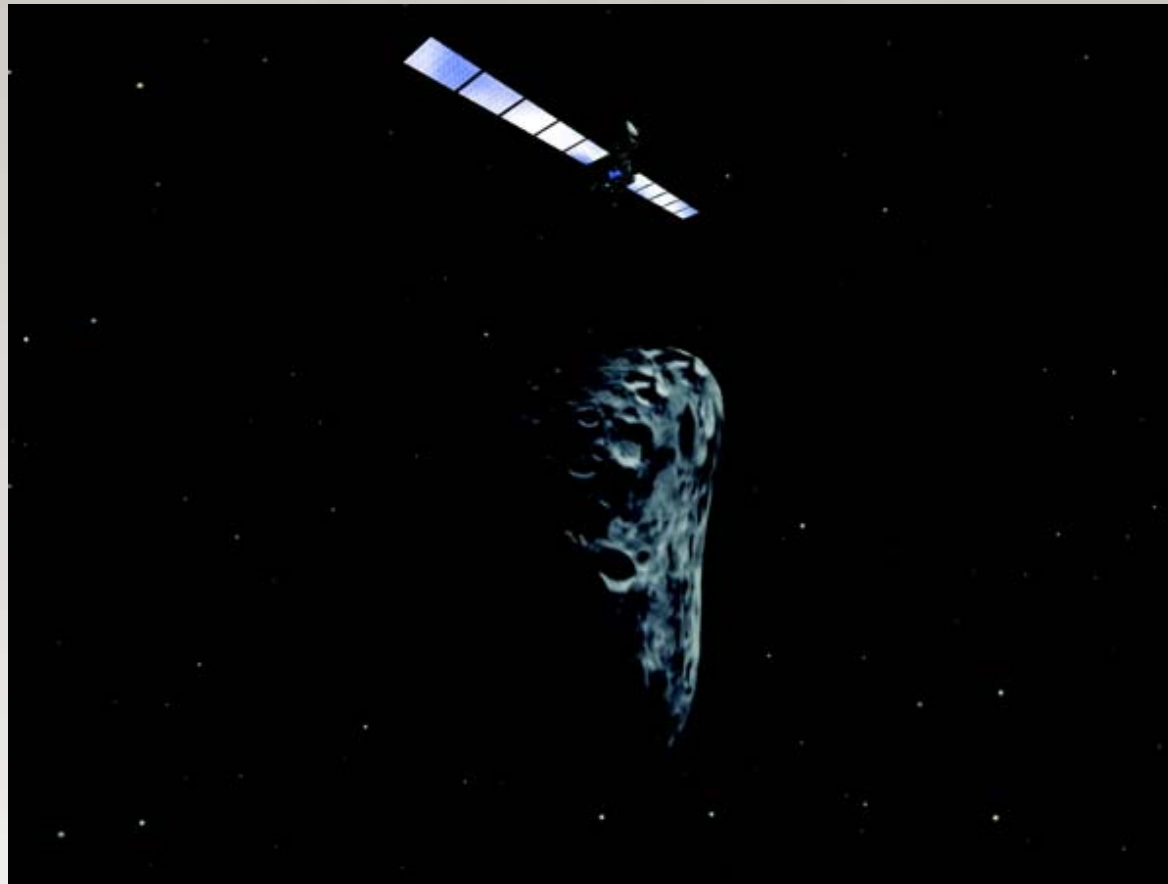
Moon, OSIRIS camera,
13 November 2007



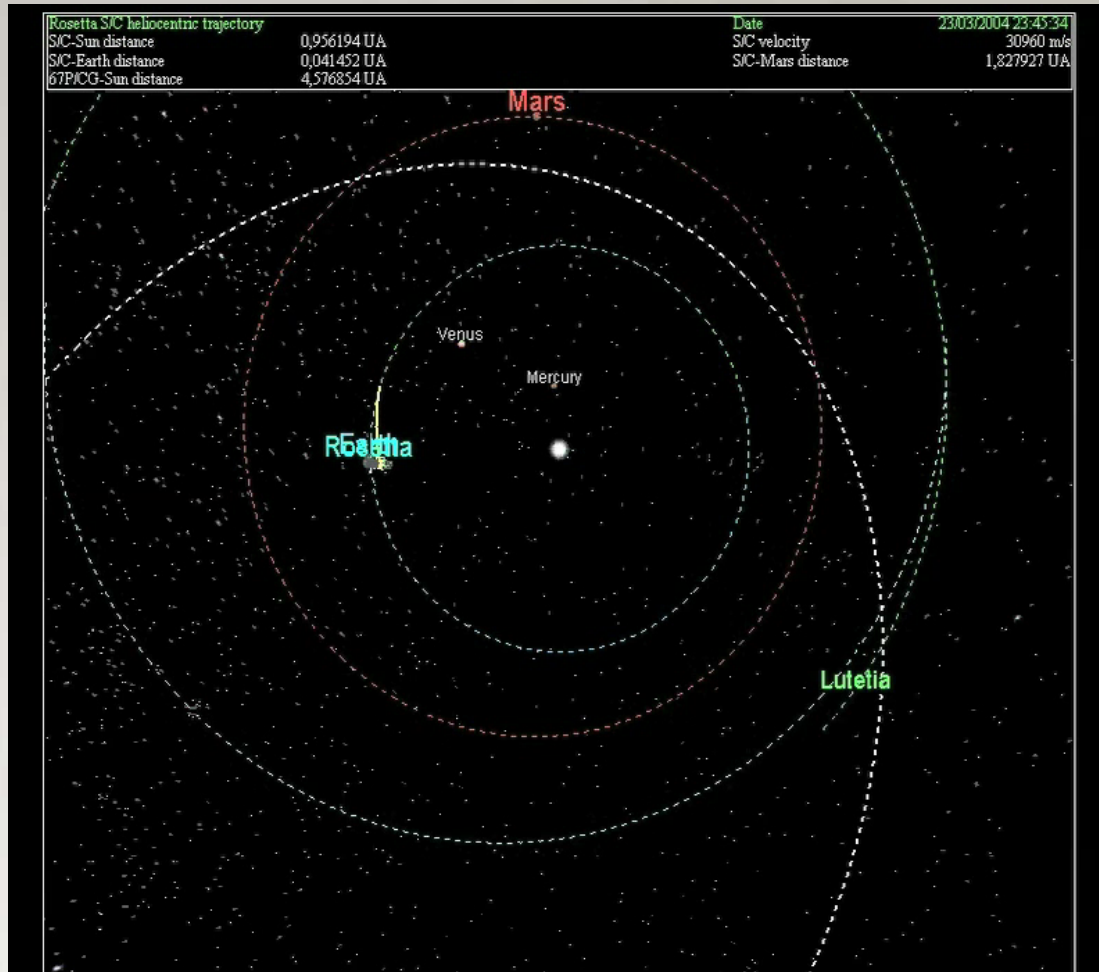
Earth, OSIRIS camera,
15 November 2007

Nominal science starts: Steins fly-by

5 September 2008 at 800 km distance



Rosetta's orbit



Animation courtesy of CNES