Rosetta

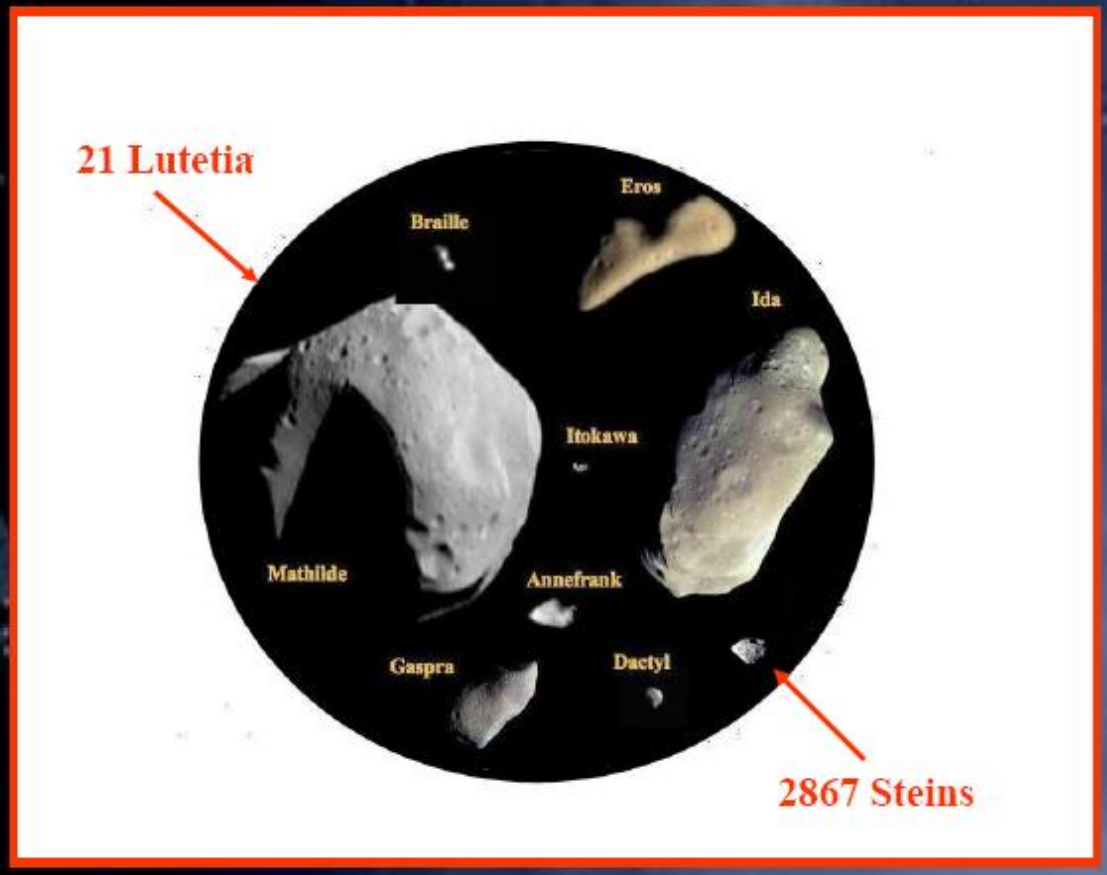
has swung by Earth twice and Mars once, performing gravity-assist manoeuvres, that gave it the necessary boost to continue on its journey. The third and last Earth swing-by was on November 2009.

The spacecraft has also flown by two asteroids and study them on the way: (2867) Steins in September 2009 and (21) Lutetia in June 2010.

Other Major Journey Milestones

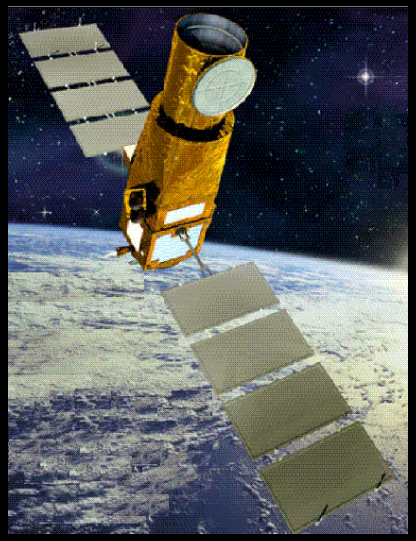
Launch 2 March 2004
First Earth swing-by 4 March 2005
Mars swing-by 25 February 2007
Second Earth swing-by 13 November 2007
Third Earth swing-by 13 November 2009
Comet 67/P Churyumov-Gerasimenko rendez-vous May 2014
Landing on the comet November 2014
Escorting the comet until end 2015

Asteroid comparative sizes



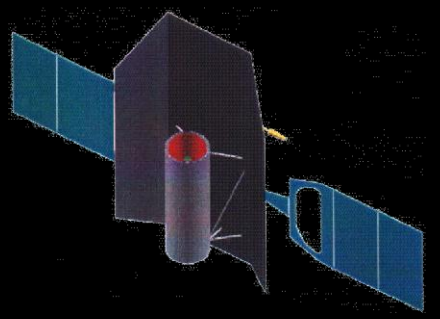
NEO SMP - Selected mission concepts /1

EUNEOS (Alcatel, O. Côte d'Azur, SGF): A space survey from an inner Solar System orbit to detect most of NEO's => 1 km and many in the 100's m range



Earthguard I (Kaiser Threde, DLR, SGF, ISU) : 1. A definition of BepiColombo "hitch-hiker" payload discovery and NEO's (mainly those not observable from Earth), and 2. A comparison with alternative mission concepts involving solar sails or SEP

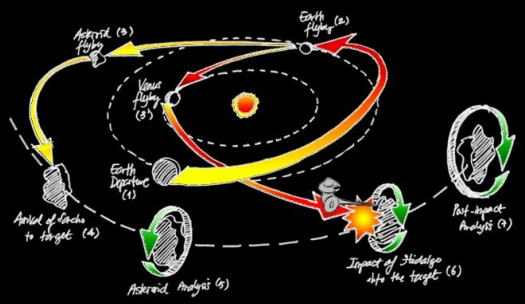
Remote Observation of NEOs from Space (Alenia, SSTL, O.A. Torino) An space based observatory in Earth's L2 detecting and carrying out remote sensing (both in VIS and IR) of NEO's



NEO SMP - Selected mission concepts /2

SIMONE (QinetiQ, PSSRI, Science Systems, Telespazio, Pol. Milano) Low-cost micro-satellites to fly by and/or rendez-vous a number of NEOs and determine their masses

ISHTAR (Astrium Ltd, Obs. Paris-Meudon, Obs Roma, LPG – Grenoble, PSSRI, Univ. Köln): Orbiter using Radar Tomography (i.e. the imaging of the interior of a solid body using Ground Penetrating Radar) to study the NEOs internal structure



Don Quijote (Deimos Space, Astrium GmbH, Univ. Pisa, SGF): A pair of spacecraft, one hitting a target asteroid at high speed while the other one observes -from orbit about the object- before, during and after the impact to extract information on the object's internal structure.

MarcoPolo ASR

Science Objectives
The main scientific objectives of the Marco Polo Mission can be summarised as follows:

The Marco Polo primary mission objective is to safely return a sample from a primitive NEO;

The Marco Polo mission shall place the samples in their global and local context;

The Marco Polo mission shall provide complementary science results not achievable from the samples themselves.

Requirements and Design Drivers

The requirements for the Marco Polo mission design were:

- Launch with a Soyuz-2-1b Fregat vehicle from Kourou;
- Launch in 2017 or 2018 (later launch years were also studied for some cases);
- Total mission duration: 8 years in the baseline case (for the backup mission, longer mission durations may be acceptable);
- Maximum atmospheric entry velocity at Earth return: 15 km/s. This corresponds to hyperbolic arrival velocities of around 9 – 11 km/s.