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Marco Polo, a JAXA-ESA sample return mission to a Near-Earth Object

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Marco Polo is a sample return mission to a Near-Earth Object (NEO). It is proposed to be performed in collaboration between the European Space Agency (ESA) and the Japanese Space Agency (JAXA). Both JAXA and ESA are currently performing Phase-A studies for this mission; within ESA, the mission is studied as part of the Cosmic Vision 2015-2025 Programme.

The main objective of the mission is to return unmodified material from a primitive NEO to the Earth to allow its accurate analysis in ground-based laboratories. These primitive NEOs are part of the small body population that represents the leftover building blocks of the Solar System formation process. They offer important clues to the chemical mixture from which the planets formed about 4.6 billion years ago and carry records both of the Solar System's birth and early phases. In addition, the mission will allow studying the geological evolution and physical properties of small bodies. Marco Polo will provide the first opportunity for detailed laboratory study of the most primitive materials that formed the terrestrial planets and advance our understanding of some of the fundamental issues in the origin and early evolution of the Solar System, the Earth and possibly life itself. Determining the physical properties of a NEO will also help assessing mitigation strategies for the impact risk of such an object on the Earth.

This presentation will focus on the ESA side of the assessment study. The technical development status in Europe will be presented.