

## **A sample return mission to a pristine NEO submitted to ESA CV 2015-2025**

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ESA Cosmic Vision 2015-2025 aims at furthering Europe's achievements in space science, for the benefit of all mankind. ESA's multinational Space Science Advisory Committee prepared the final plan, which contains a selection of themes and priorities. In the theme concerning how the Solar System works, a Near-Earth Object (NEO) sample return mission is indicated among the priorities. Indeed, small bodies, as primitive leftover building blocks of the Solar System formation process, offer clues to the chemical mixture from which the planets formed some 4.6 billion years ago. The Near Earth Objects (NEOs) are representative of the population of asteroids and dead comets and are thought to be similar in many ways to the ancient planetesimal swarms that accreted to form the planets. NEOs are thus fundamentally interesting and highly accessible targets for scientific research and space missions. A sample return space mission to a pristine NEO has thus been proposed in partnership with the Japanese Space Agency JAXA, involving a large European community of scientists. The principal objectives are to obtain crucial information about 1) the properties of the building blocks of the terrestrial planets; 2) the major events (e.g. agglomeration, heating, ... ..) which ruled the history of planetesimals; 3) the properties of primitive asteroids which may contain presolar material unknown in meteoritic samples; 4) the organics in primitive materials; 5) the initial conditions and evolution history of the solar nebula; and 6) on the potential origin of molecules necessary for life. This project appears clearly to have the potential to revolutionize our understanding of primitive materials. It involves a main spacecraft which will allow the determination of important physical properties of the target (shape, mass, crater distribution ...) and which will take samples by a touch-and-go procedure, a Lander for in-situ investigation of the

sampling site, and sampling depending on technological development and resource allocations, a re-entry capsule, and scientific payloads. We will present the mission targets, scenarios and techniques that have been proposed.