



The European Commission funded NEO-MAPP project in support of the ESA Hera mission: Near-Earth Object Modelling And Payload for Protection

Patrick Michel¹, Albert Falke, Stephan Ulamec, and the NEO-MAPP Team*

¹Université Côte d'Azur, Observatoire de la Côte d'Azur, CNRS, Laboratoire Lagrange, Nice, France (michelp@oca.eu)

*A full list of authors appears at the end of the abstract

NEO-MAPP stands for Near Earth Object Modelling And Payload for Protection. This project is funded by the H2020 program of the European Commission and addresses the topic "Advanced research in Near Earth Objects (NEOs) and new payload technologies for planetary defence" (SU-SPACE-23-SEC-2019).

NEO-MAPP selected as primarily reference scenario the ESA Hera mission, which has recently been approved by the ESA Council at Ministerial Level, Space19+, in November 2019 for launch in 2024. The main goal of NEO-MAPP is to support the development and data analysis of NEO missions, as Hera and provide significant advances in both our understanding of the response of NEOs to external forces (in particular a kinetic impact or a close planetary approach), and in the associated measurements by a spacecraft (including those necessary for the physical and dynamical characterization in general).

The NEO-MAPP objectives, include: (1) Pushing the limits of numerical modelling of the response of NEOs to a kinetic impact, as well as of their physical and dynamical properties while maturing European modelling capabilities linked to planetary defence and NEO exploration; (2) Increasing the maturity of multiple spaceborn and landed European instruments directly related to planetary defence, while focusing on measurements of surface, shallow sub-surface and interior properties of NEOs; (3) Developing algorithms and simulators to prepare for closeproximity operations and payload data analyses and exploitation; (4) Developing innovative and synergetic measurement and data-analysis strategies that combine multiple payloads, to ensure optimal data exploitation for NEO missions; (5) Developing and validating robust GNC strategies and technologies enabling surface interaction and direct response measurements performed by CubeSat or small/micro-lander architectures.

Building on the expertise of NEO-MAPP participants, who are directly involved in the Hera mission and some of them also in other relevant missions (e.g., NASA OSIRIS-REx, JAXA Hayabusa2 and MMX), the NEO-MAPP consortium is ideally set to further advance NEO scientific research and payload technologies. NEO-MAPP will also dedicate considerable resources to developing important and innovative synergies between the two sub-topics. As such, NEO-MAPP will provide significant advances in our understanding of NEOs while at the same time build upon and sustainably increase expertise of European scientists and engineers in both planetary defence efforts and small-body exploration.

Acknowledgement: This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870377 (project NEO-MAPP).

NEO-MAPP Team:

Karl Atkinson, Paula Benavidez, Jens Biele, Mélanie Drilleau, Colleen Fiaschetti, Sarah Fontaine, Paulo Gordo, Alain Hérique, Martin Jutzi, Ozgur Karatekin, Julia de Leon, Javier Licandro, Naomi Murdoch, Danica Rémy, Grig Richter, Francisco da Silva Pais Cabral, Paolo Tortora, Kleomenis Tsiganis, Jean-Baptiste Vincent, George Voyatzis, Kai Wuennemann, Marco Zannoni

NEO-MAPP Team: Karl Atkinson, Paula Benavidez, Jens Biele, Mélanie Drilleau, Colleen Fiaschetti, Sarah Fontaine, Paulo Gordo, Alain Hérique, Martin Jutzi, Ozgur Karatekin, Julia de Leon, Javier Licandro, Naomi Murdoch, Danica Rémy, Grig Richter, Francisco da Silva Pais Cabral, Paolo Tortora, Kleomenis Tsiganis, Jean-Baptiste Vincent, George Voyatzis, Kai Wuennemann, Marco Zannoni