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NEO Characterization

THE NEO-MAPP PROJECT, FUNDED BY THE EUROPEAN COMMISSION IN SUPPORT OF THE ESA HERA MISSION

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ABSTRACT

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

In the frame of the NEO-MAPP project, the ESA Hera mission has been selected as prime reference scenario. Hera has 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. It will provide significant advances in our understanding of the response of NEOs to external forces (in particular a kinetic impact like the one demonstrated with the NASA DART mission in September 2022, or a close planetary approach), as well as in interpreting the

associated measurements by a spacecraft (e.g. those necessary for characterizing the physical and dynamical properties).

The NEO-MAPP objectives, include:

- 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.
- Increasing the maturity of multiple spaceborne and landed European instruments directly related to planetary defence, while focusing on measurements of surface, shallow sub-surface and interior properties of NEOs.
- Developing algorithms and simulators to prepare for close-proximity operations and payload data analyses and exploitation.
- Developing innovative and synergetic measurement and data-analysis strategies that combine multiple payloads, to ensure optimal data exploitation for NEO missions.
- Developing and validating robust GNC strategies and technologies enabling surface interaction and direct response measurements performed by CubeSat or small/micro-lander (µLander) architectures.

Building on the expertise of NEO-MAPP consortium partners, who are directly involved in the Hera mission and, in some cases, also in other relevant missions (e.g., NASA OSIRIS-REx, JAXA Hayabusa2 or MMX), the NEO-MAPP consortium is in a perfect situation to further advance NEO scientific research and payload technologies. NEO-MAPP is also dedicating considerable resources to developing important and innovative synergies between the sub-topics (modelling, instrument development and data analysis). Consequently, NEO-MAPP will provide significant advances in our understanding of NEOs while at the same time build upon and sustainably increase the expertise of European scientists and engineers in both planetary defence efforts and small-body exploration.

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Comments:

(Oral preferred. First author is P. Michel, presenter: S. Ulamec)