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Planetary Defense – Recent Progress & Plans
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NEOSHIELD-2 EU PROJECT:
PHYSICAL AND COMPOSITIONAL CHARACTERIZATION OF SMALL NEAs

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ABSTRACT

One of the main aims of the NEOShield-2 project, financed by the European Commission (2015-2017) to follow the first NEOShield (2012-2015), is to undertake an extensive observational campaign to provide a physical and compositional characterization of a large number of near Earth asteroids (NEAs) in the 50-300 m size range.

Photometric, spectroscopic and thermal infrared observations will be carried out using guaranteed rapid access to worldwide telescopes owned by NEOShield-2 consortium members (12 telescopes in the 1-2 m size range, 2 in the 3-4 m, and 1 in the 8 m), as well as by competitive proposals to get access to medium/large

telescopes and very large telescopes. A negotiation for purchase of observational time at ESO NTT 3.5m telescope (La Silla, Chile) has been successfully carried out and the scheduling procedure of a substantial number of observation runs is under process.

The characterization of NEAs is fundamental to assess and mitigate their impact risk with our planet. Moreover, understanding physical properties of asteroids can disclose crucial information on the origin and early evolution of the solar system. Asteroid composition can also provide information about the compositional gradient of the solar nebula and the processes that governed the first evolutionary phases at different heliocentric distances. Moreover, asteroid studies can help shedding light on topics such as the delivery of water and organic-rich material to the early Earth, and the emergence of life.

Unfortunately, only a sparse literature about these bodies exists, covering just ~1.5% of the known small (< 300 m) population, which represents the main source of risk. Our observing strategy is to have an operational interface with ESA NEOCC in order to optimize observations devoted to physical characterization, in particular for newly discovered objects needing rapid response times, and to optimize the exploitation of all the instruments to which we have access.

In the course of the project, we estimate to obtain new data of about 150 objects smaller than 300 m, increasing of about 200% the number of studied NEAs in this size range. Information about the size, shape, rotation, composition, regolith properties and albedo of small NEAs will be obtained by photometric, spectroscopic and thermal IR observations by NEOShield-2 consortium members.

This large sample of data acquired with the same instrumentation and analyzed by the same scientific team will minimize several bias effects present in the literature data, and will allow us for the first time ever to carry out an in-deep statistical study of the small NEA population. The results of our observations and data analysis will establish a new benchmark of knowledge and understanding of the physical properties of NEAs.
