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NEOROCKS: COMPOSITIONAL PROPERTIES OF NEAR-EARTH OBJECTS FROM SKY SURVEYS

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ABSTRACT

The NEOROCKS project is a study of the population of near-Earth objects (NEOs) through their compositional properties. We gather data from four sources: the Sloan Digital Sky Survey, the SkyMapper Southern Survey, the Gaia DR3, and a compilation of ground-based spectra. The data is processed and merged into a single catalog of over 5,000 NEOs with visible colors. We refer to near-Earth objects (NEOs) in a broad sense, including both near-Earth and Mars-crosser asteroids (NEAs and MCs).

The taxonomic class of each NEO is determined by computing a weighted mean of the NEO's colors from multiple measurements and comparing their colors to a reference database of known asteroid spectra (Mahlke et al. 2022). Additionally, a single-color (two filters) taxonomy is performed by comparing the colors of the NEOs to one million colors from the SDSS database of known asteroids. The distribution of taxonomic classes among NEOs is analyzed and compared to previous studies of NEO taxonomy.

We analyze the effects of space weathering and the source regions of the NEOs are also investigated and their distribution of taxonomic classes. Their proximity to Earth makes them attractive targets for space exploration, but their potential threat to our planet also makes it important to study their properties in order to plan for risk mitigation.

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