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○ **New NEO Characterization Results**

Photometry of hundreds of NEOs from SDSS

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Data mining encompasses methods to extract astrometry or photometry from digital sky survey, that may have been overlooked in previous analyses, the data being taken for other purposes. Depending the region of the sky surveyed, and the cadence of the survey, some sky surveys may be well-adapted to detect Solar System Objects (SSOs). For instance, the imaging part of the Sloan Digital Sky Survey (SDSS), which operated from 1998 to 2008, with 5 images taken over 5 minutes only in five different filters (u, g, r, i, z) has been a major source of colors of asteroids [1, 2].

However, while the released Moving Object Catalog (MOC) contained about 470,000 observations of moving objects, only a few near-Earth Asteroids (NEAs) were identified [3]. We will report on our recent re-analysis of the SDSS public archive. We combine two approaches: a broad extraction of candidate moving sources from SDSS catalogue, and a specific extraction of SDSS sources corresponding to known objects. We apply multiple filters to reject any non-moving contaminants from the catalogue.

Our catalogue includes multifilter photometry of more than one million observations of above 300,000 individual SSOs, including 1,639 Near-Earth Asteroids and 4,226 Mars-Crossers. From visual inspection of a subset of the catalogue, its completeness is estimated to 95% and its purity above 97%.

The case of NEAs is particular, as they present trailed signal in SDSS images (54s exposure). The SDSS photometry optimized for stars and galaxies (the main targets of the survey) is not adequate, and we will present updated photometry performed on SDSS public images. We downloaded above 4,000 images (g, r, i, z bands) of NEAs and selected a sample of 400+ NEAs with the highest signal-to-noise ratio. We measure the photometry using elliptical aperture photometry.

We use the photometry in the four filters to classify the NEAs in a taxonomic scheme based on Bus-DeMeo taxonomy [4], extending the work by [5]. We will present our results on the taxonomic distribution of NEAs and of their source regions [6].

References

[1] Ž. Ivezić, S. Tabachnik, R. Rafikov, R. H. Lupton, T. Quinn, M. Hammergren, L. Eyer, J. Chu, J. C. Armstrong, X. Fan, K. Finlator, T. R. Geballe, J. E. Gunn, G. S. Hennessy, G. R. Knapp, S. K. Leggett, J. A. Munn, J. R. Pier, C. M. Rockosi, D. P. Schneider, M. A. Strauss, B. Yanny, J. Brinkmann, I. Csabai, R. B. Hindsley, S. Kent, D. Q. Lamb, B. Margon, T. A. McKay, J. A. Smith, P. Waddel, D. G. York, the SDSS Collaboration, Solar System Objects Observed in the Sloan Digital Sky Survey Commissioning Data, AJ 122 (2001) 2749–2784.

[2] A. Parker, Ž. Ivezić, M. Jurić, R. Lupton, M. D. Sekora, A. Kowalski, The size distributions of asteroid families in the SDSS Moving Object Catalog 4, Icarus 198 (2008) 138–155.

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[1]

[3] E. Solano, C. Rodrigo, R. Pulido, B. Carry, Precovery of near-Earth asteroids by a citizen-science project of the Spanish Virtual Observatory, Astronomische Nachrichten 335 (2014) 142.
[4] F. DeMeo, R. P. Binzel, S. M. Slivan, S. J. Bus, An extension of the Bus asteroid taxonomy into the near-infrared, Icarus 202 (2009) 160–180.
[5] F. DeMeo, B. Carry, Solar System evolution from compositional mapping of the asteroid belt, Nature 505 (2014) 629–634.
[6] M. Granvik, A. Morbidelli, D. Vokrouhlický, W. F. Bottke, D. Nesvorný, R. Jedicke, Escape of asteroids from the main belt, A&A 598 (2017) A52.