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Near-Earth Asteroid – Meteorite Puzzle: Putting the pieces together

R. P. **Binzel**
Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA, USA (rpb@mit.edu)

Abstract

For decades the spectral measurements of asteroids seemed a misfit with the population of falling meteorites [1]. However the pieces are now falling into place thanks to increasingly diagnostic and abundant spectral measurements of near-Earth asteroids [e.g. 2, 3, 4], spacecraft ground truth [5,6], and insights into space weathering [7].

Presented here will be the findings and relationships based on new near-Earth asteroid spectral data for more than 200 objects, measured through the *The MIT-Hawaii-IRTF Joint Campaign for NEO Spectral Reconnaissance* [8,9]. These results, when combined with source region analysis [10, 11, 12] now fit reasonably well together. While certainly not "solved", many of the longstanding difficulties of connecting the asteroid and meteorite populations now appear to be behind us. Interesting new questions involve the balance between apparently rapid space weathering [7] and the surface refresh rate for near-Earth asteroids caused by planetary encounters [13,14] and YORP spin-up [15]. Breaking through some of the previous barriers also allows new investigation of links to more rare classes of meteorites, such as the ureilites [16].

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