

## The Colors of Young Asteroids

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Recent spectral observations of asteroids have identified a plausible origin for the ordinary **chondrite** meteorites (**OCs**). Owing to the paucity of main-belt asteroids with matching spectra [1], it had previously been difficult to explain their origin. Now a significant number of km-sized Earth approaches (bodies with perihelia  $< 1.3$  AU) have been observed with reflectance spectra similar to OCS, and with spectra spanning the range from OCS to S-type asteroids [2,3]. Furthermore, fresh surfaces on Ida and Gaspra exposed by recent **cratering** show **OC-like** spectra [4]. Hence, OCs may be the unweathered fragments of S-type asteroids, which dominate the inner regions of the main belt where most Earth approaches are thought to originate [5].

Here, new spectral observations of Earth approaches are reported that support the weathering hypothesis. Using JPL's 24" telescope at Table Mountain Observatory in Wrightwood CA to measure BVRI colors for 34 bodies in the 0.3 to 3 km size range, the resulting data show that most Earth approaches larger than 2 km have reddish reflectance colors similar to S-type asteroids, whereas the smaller bodies have spectra similar either to C-type asteroids or to OCS. Furthermore, there are few S-type Earth approaches with **semimajor** axes  $> 2.3$  AU. These trends are expected if weathering increases with age, causing OCS to look S-like. The predominance of neutral colored bodies at small sizes may indicate an additional cometary source.

[1] R. P. Binzel et al, Science 262, 1541 (1993).

[2] R. P. Binzel et al, Science 273,946 (1996).

[3] M.D. Hicks et al, submitted to Icarus (1997).

[4] C. R. Chapman, Meteor. & Planet. Sci. 31,699 (1996).

[5] D. L. Rabinowitz, Icarus 127,33 (1997).

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