COMPOSITIONS OF BINARY NEAR-EARTH OBJECTS: IMPLICATIONS FOR THE INTERNAL STRUCTURE OF THEIR PARENT BODIES.

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**Introduction:** Approximately 1/6\textsuperscript{th} of all the near-Earth objects (NEOs) observed to date are binaries [1]. Since NEO dynamical lifetimes are relatively short (~10\textsuperscript{6}-10\textsuperscript{7} years), an active mechanism must be forming new NEO pairs [2]. Proposed formation mechanisms invoke close flybys of the Earth (or Venus) and involve either tidal disruption [3], or rotational spin-up and disruption [4]. In either scenario, parent NEO bodies were either composed of physically weak materials (e.g., strengths similar to CI or CM chondrites) or were gravitationally bound rubble piles with little or no internal strength.

**Observational Constraints:** If binary NEOs are generated primarily by disaggregation of km-scale NEO parent bodies during close planetary flybys, then the two models of parent body weakness predict different compositional patterns for the formation of NEO binaries. If NEO binaries form primarily from physically weak materials, they should be dominantly similar to CM- or CI-type materials. If these binaries form primarily from disruption of strengthless rubble piles, then there shouldn’t be any particular compositional preference. Near-infrared spectra of several NEO binaries have been collected, including 1998 ST\textsubscript{27} [5], 2003 YT\textsubscript{1} [6], and (66063) 1998 RO\textsubscript{1} [7]. The first binary NEO studied (1998 ST\textsubscript{27}) was identified as a CM-type assemblage. However, subsequently 2003 YT\textsubscript{1} was identified as an HED assemblage, and 1998 RO\textsubscript{1} appears to be a moderately metamorphosed L-chondrite.

**Conclusions:** The CM-type composition of 1998 ST\textsubscript{27} supports the suggestion that binary NEOs can be generated from physically weak materials. However, HED and L5-like assemblages are not physically weak materials. Thus the current compositional characterizations of binary NEOs suggest that most of the NEO parent bodies were gravitationally bound rubble piles, and not simply just weak carbonaceous materials.

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