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KT Boundary Chromites Determined to be Terrestrial: Cr Isotopic Evidence for Excavation and Ejection of Mafic/Ultramafic Rocks by the KT Boundary Impact

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1 Abstract

Evidence for a mantle and/or basaltic component in KT boundary distal ejecta is apparently inconsistent with ejection from Chicxulub Crater since it is located on ~35 km thick continental crust (DePaolo et al., 1983; Montanari et al., 1983; Hildebrand and Boynton, 1988, 1990). Evidence for mafic/ultramafic target rocks was reinforced by discovery of chromites, some with shock planar deformation features (PDF), in impact layer samples from sites in southern Colorado and eastern Wyoming (Bohor et al., 1990). However, until now it was unclear whether the chromites originated with an impactor or with terrestrial target rocks. To this end, high-precision ⁵⁴Cr/⁵²Cr isotope ratios were measured on KT boundary chromites along with known terrestrial chromites. We find a terrestrial ⁵⁴Cr/⁵²Cr ratio in KT boundary chromites from impact layer samples collected at the above sites over the last several years (Fig. 1). Ejected terrestrial chromites suggest the impact sampled terrestrial mafic and/or ultramafic target rocks not known to exist in the Chicxulub target area.

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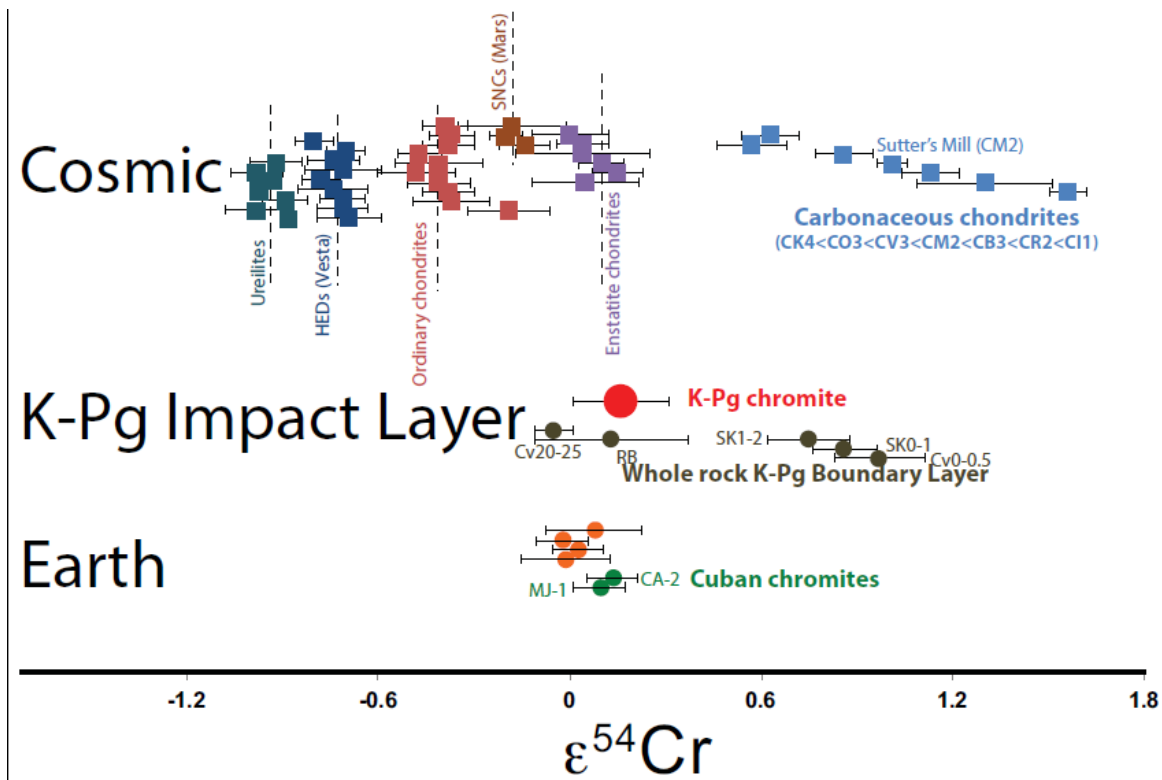


Fig. 1. Chromium isotopic composition of Raton Basin (RB) KT boundary layer chromite and Cuban chromites (MJ-1 and CA-2) in comparison with meteorite (ureilites, HEDs, SNCs, ordinary, enstatite, and carbonaceous chondrites) and terrestrial samples, as well as previously analyzed, bulk KT boundary layer samples (Stevens Klint (SK); Caravaca (Cv)). Literature Cr isotopic data from (Trinquier et al., 2006, 2007; Yamakawa et al., 2010; Jenniskens et al., 2012, 2014; Popova et al., 2013).