Geochemical data reported by Paquay et al. do not refute Younger Dryas impact event

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In the 12,900-year-old Younger Dryas boundary layer (YDB), Firestone et al. (1) reported inferred ET iridium (Ir) peaks in sediments and magnetic separates that coincide with elevated abundances in potential impact markers including microspherules and nanodiamonds (2). Paquay et al. (3) tested YDB sediments but could not reproduce previous Ir concentrations. However, their results appear problematic because standardization uncertainties ranged up to ±140% (3:Table S2) and reproducibility varied up to ~400% (3:Table S1). Despite those uncertainties, they measured Ir peaks at Murray Springs, Arizona (profile B1) and Lake Hind, Alberta (batches 1+2) at the same stratigraphic levels as spikes in nanodiamonds, magnetic grains, and microspherules (Figure 1). Although their Ir values are ~7% of our median values, they rise to ~33% of our lower limits and to >300% above background. Also, they reported sedimentary osmium ratios ($^{187}Os/^{188}Os$) that appear terrestrial; however, they did not analyze YDB magnetic separates, where previously reported Ir concentrations were much higher and where $^{187}Os/^{188}Os$ ratios might possibly display an ET component, as Sharma et al. (4) reported from YDB-aged Pacific and Atlantic ferromanganese crusts. Paquay et al. also speculated that wildfires created the YDB nanodiamonds, contradicting ~100 years of research demonstrating that nanodiamonds form only under extreme temperature and/or pressure regimes (5), as occurred during the K/T impact and as proposed for the YDB. Overall, Paquay et al.'s results are useful contributions to the YDB discussion, reinforcing the importance of additional research into the co-occurrence of potential Ir and Os anomalies with inferred impact proxies.

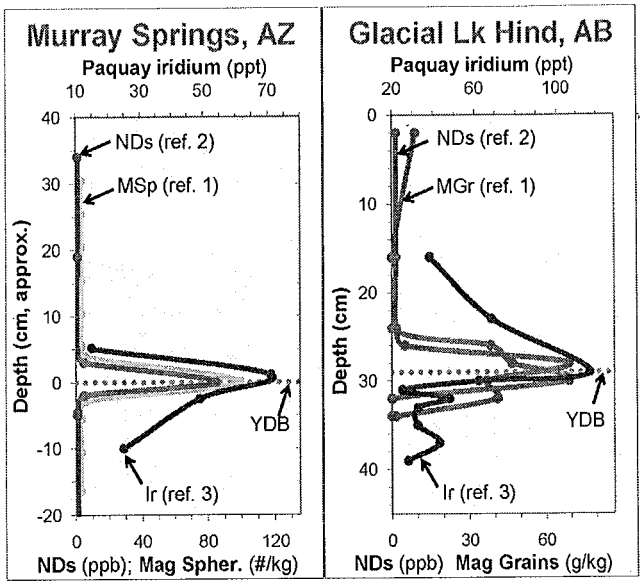

Figure 1. Concentrations of Ir (red) from Paquay et al. (3) compared to nanodiamonds (blue)(2), magnetic grains (dark green)(1), and microspherules (light green)(1).

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(3) Paquay FS, Ravizza G, Goderis G, Claeys P, Goderis G, Vanhaeck F, Boyd M, Surovell TA, Holliday VT, and Haynes VA, Jr. (2009) Absence of geochemical evidence for an impact event at the Bølling–Allerød/Younger Dryas transition. *Proc Natl Acad Sci USA.* 104 (51): 21505-21510

(4) Sharma M, Chen C, Jackson BP, Abouchami W. (2009) High resolution Osmium isotopes in deep-sea ferromanganese crusts reveal a large meteorite impact in the Central Pacific at 12 ± 4 ka. *EOS Trans. AGU, 90*(52), Fall Meet. Suppl., PP33B-06

(5) Wen B, Zhao J, Li T. (2007) Synthesis and crystal structure of n-diamond. *Int Mater Rev* 52:131–151.

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