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Signs of a large Paleocene impact, preserved around Disko Bay, West Greenland?

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On the Nuussuaq peninsula, Western Greenland sedimentary deposits of glass spherules also contain high Ir, Co, Ni, and Cu anomalies. The iron-rich silicate glass spherules (to ∼3 wt% NiO, ∼35 wt% FeO) are highly circular in cross section. They show surface dissolution, smectite replacement and calcite infilling of vesicles, though many glasses are optically unaltered. They are strikingly heterogeneous, with schlieren outlining counter-flowing convection cells. Their pronounced Fe-Ni correlation is unlike volcanic suites, but is explained by mixing between basaltic melt and an enriched iron-nickel source. Distinctive nickel-spinel (∼7–10 wt% NiO) contains very nickel-rich cores. Occasional glass spherules show compositional gradients toward resorbed silicates, (plagioclase, clinopyroxene); isotropic plagioclase has anomalous texture comparable to impact-melted lunar breccias. Their anomalously high copper and sulfur (to ∼1%) have lead to an explanation as products of fire-fountaining of exotic or picritic Disko lavas; they would be perhaps the only non-impact occurrence of Ni spinel. New mineralogical and petrographic textural data for the Nuussuaq spherules suggest they should be reinterpreted as impact ejecta; the highly oxidized Ni-spinel is a very characteristic signature of meteorite impact ejecta. Delicate preservation features rule out substantial sedimentary reworking, and spherule bed thicknesses imply a large source crater. Stratigraphically, the spherule beds (ca. 61–62 Ma), lie beneath West Greenland picritic flood lavas.