

# Magmatism

## Impact debris in Britain (*February 2018*)

These days reports of geological evidence for [asteroid impacts](#) are not regarded with a mixture of disbelief, wonder and foreboding: well, not by geologists anyway. But for such a small area as Britain now to have three of widely different ages and in easily accessible places is pretty good for its brand as the place to visit for practically every aspect of Earth history. The first to be discovered lies at the base of Triassic mudstones near Bristol (see [Britain's own impact](#)) and would need some serious grubbing around at a former construction site. The next to emerge was located in one of the best geological districts in the country at several easily accessed coastal exposures in Northwest Scotland. A [glass-rich ejecta layer](#) occurs in the basal Torridonian Stoer Group on Stac Fada, Stoer, Sutherland (UK National Grid Reference 203300, 928400). The most recently found (Drake, S.N. and 8 others 2018. Discovery of a meteoritic ejecta layer containing unmelted impactor fragments at the base of Paleocene lavas, Isle of Skye, Scotland. *Geology*, v. **46**, p. 171-174; doi:10.1130/G39452.1) is on the Inner Hebridean island of Skye at the base of its famous Palaeocene flood basalt sequence (UK National Grid Reference 155371,821112).



View to the northwest across Loch Slapin to the Cuillin Hills of Skye (Central Igneous Complex). The flood basalts beneath which the ejecta layer occurs are just above the trees.  
(Credit: Wikipedia)

The last is perhaps the most spectacular of the three, as it contains the full gamut of provenance, matched only by material from the drill core into the 66 million year-old [Chicxulub crater](#). The 0.9 m thick debris layer rests directly on mid-Jurassic sandstones beneath Palaeocene basalts of the [North Atlantic Igneous Province](#) (NAIP). The layer contains a basalt clast dated at 61.54 Ma, but is dominantly reminiscent of a pyroclastic

ignimbrite flow as it contains glass shards. But there the resemblance ends for the bulk of small clasts are of quartz and K-feldspar, sandstone and gneiss. Zircons extracted from the debris show shock lamellae and give Archaean and Proterozoic ages commensurate with the local basement, but also with the bulk of the Scandinavian and Canadian Shields. So the impact could have been anywhere in such widespread terrains, although the enclosed basalt narrows this down to areas where basement is overlain by lavas of the NAIP. The Skye impactite contains unmelted meteorite fragments in the form of titanium nitrides alloyed with vanadium and niobium, metallic iron-silicon alloy containing exsolved carbon, and manganese sulfide.

Although it may be coincidental, the situation of the ejecta layer immediately beneath the Skye lavas, its containing a clast of basalt whose age corresponds to the oldest flows anywhere in the NAIP is fascinating. But the actual impact site is, as yet, unknown. Even so, the layer provokes thoughts about whether an impact may have been more than spatially related to the large NAIP flood basalt pile, preserved on either side of the North Atlantic. If the event was large, then surely the ejecta should be preserved near the base of the flood basalts elsewhere in NW Britain and further afield