Is there a “Manicouagan Event Horizon” in the late Trias?

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The date of the 100km wide Manicouagan crater at c.214ma has been questioned by some, but the recent finding of a well developed impact deposit of the same (diagenetic) age reinforces the quest for an extensive and identifiable “Manicouagan Event horizon”. This new deposit, from a single locality in southwestern Britain, is the first unequivocal record of a late Triassic impact deposit anywhere in the world, and is only the second significant impact deposit in the Mesozoic.

It is characterised by abundant mm-sized emerald green pseudomorphs of microtektites together with shocked quartz and other apparently crater-derived detritus. The layer is mixed with locally derived clastic sediment and averages 25mm thick. It shows evidence of accumulation as a slurry. The host succession comprises distal fan redbeds and the layer lies c. 20-25m below the locally obvious Rhaetian marine transgression. Ar-Ar isotope dates on closely associated diagenetic K-feldspars give 214±2.5Ma. No associated iridium anomaly has yet been identified.

The high shock state of the quartz indicates a major impact event, and on the basis of pre-Atlantic continental assembly, the Manicouagan impact site was only 20 crater diameters away from the location of the new impact deposit. Whilst first approximation thickness modelling of the deposit points to Manicouagan, a nearer but somewhat smaller crater of the same age is Rochechouart (central France), and an unknown source crater is also possible. Given the similarity of dates between candidate craters and the deposit itself, there is a prima facie case for a synchronous and widespread environmental trauma.

An impact the size of Manicouagan will have had widespread consequences across Pangea and some environmental effects ought to show in contemporaneous sediments. The new impact deposit may be good direct indicator, but recent reports also include possible associated tectonic disturbance, soft sediment deformation and local faunal catastrophe through impact-induced wildfire. Environmental change might be picked up in some of the more sensitive sedimentary successions such as Tethyan carbonates, but given the redbed setting of the impact deposit site the Manicouagan event apparently overtook an already degraded local environment. Fauna and flora are absent and there is no obvious sedimentological evidence for a significant environmental change.