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Floodvolcanism is the main cause of mass extinctions: Nice try, but where is the evidence?

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Besides a rather vague temporal co-incidence of some flood basalts with some of the mass-extinctions, (on a log/log scale everything always plots on the same line) there is no reason as yet to generalize flood basalts as the main cause of all mass extinctions. Case in point is the co-occurrence of the Deccan traps with the K/T boundary, where there is also (and much better) evidence for co-incidence of the mass-extinction with global impact ejecta.

Flood basalts have several shortcomings for explaining mass extinctions:

1. The flood basalts break into many small discrete lava flows and are on a global scale confined to a small area. It is hard to extend the effects over both hemispheres.
2. Deleterious effects are model dependent; there are no coupled paleobiologic data.
3. Trace elements and other data in the ejecta layer cannot be explained by flood basalt volcanism, although fairy tales of derivation from hotspot volcanos were often invoked in the past. $^{53}Cr/^{52}Cr$ data at K/T are impossible to explain by terrestrial sources.
4. Sr isotope data at the P/T boundary do not support basaltic extrusions.

1) Flood basalt extrusions are of the non-violent type, and transport of its aerosols is confined to the lower atmosphere. The total duration of the extrusions building a basalt plateau is at least 1 to 2 million years. Gigantic as they may seem, individual extrusions last less than a year and take place on average every one thousand years

or so. This means that a single flow extrudes about 500-1000 km^3 of lava, less than the 2000 km^3 produced by the Plinian volcanic eruptions of Toba lake 50000 years ago, that ended into the stratosphere and should have had a more severe effect on the earth's climate. 1000 years of rest between extrusions seems plenty of time for a complete recovery of the biosphere or climate, before the next extrusion starts. The idea that the bulk of the extrusions would have taken place in a very short time is not based on any hard data.

2) The only well dated flood basalt extrusion that can be accurately correlated through the excellent magnetostratigraphies to the sedimentary-record, the Deccan traps, is not synchronous with the K/T boundary mass-extinction, nor any other observed extinctions close to the K/T boundary. The mass extinction of oceanic microplankton, and the terrestrial extinctions of vertebrates and plants are accurately tied to the impact ejecta layer, but not to any phase within the Deccan trap extrusions that start just before the C29-C28 reversal, about 300kyr before K/T boundary. The Deccan traps can be correlated to the sedimentary record in well-known sedimentary sequences like at Caravaca, Zumaya, Spain and Gubbio, Italy, including their excellent fossil record. Yet no extinctions appear to coincide with the extrusions. The inoceramids disappear about 3.2Ma before K/T and precede the extrusions considerably. A supposed decline of dinosaur extinctions before K/T is often ascribed to Deccan extrusions. But recent work by David Fastovsky and Peter Sheehan (Fastovsky et al. 2004) clearly show that this 'decline' is an artifact of the taphonomic record. Rather the reverse, an increase in diversity, is the case. Decline and extinction of Rudists and ammonites were said to be coincident with the Deccan trap extrusions. Yet recent records of ammonites show no decline till the K/T boundary, and rudist remains are found just below the K/T boundary in Italy, Spain and Tunisia. 'Enormous' climate changes would have been documented in the late Maastrichtian, based on stable isotope records. Yet these records give conflicting results, and the organisms, planktic foraminifers, that provide an excellent proxy for both temperature changes and the vertical temperature structure of the oceans, do not show any changes at all in the last 3 million years of the Cretaceous. The assemblages of planktic foraminifers remain diversified and abundant up to the K/T boundary, and show no changes coincident with Deccan extrusions.

3) The iridium anomaly at the K/T boundary is invariably coupled to an identical chromium anomaly, in contrast to scattered e.g. cobalt, arsenic and zinc anomalies that are dependent on the K/T locality. It is therefore extremely unlikely that the source of iridium would NOT be the same as the source of the chromium.

The $^{53}Cr/^{52}Cr$ data of the K/T boundary Cr anomaly point (Shokolyukov and Lugmair, 1998) to a carbonaceous chondritic source: there is simply no terrestrial source for such Cr isotopic ratio available, in contrast to iridium itself (ultramafic rocks) and the measured osmium isotopes at K/T.

4) The ocean water $^{87}Sr/^{86}Sr$ curve shows a decrease in slope just following the beginning of Deccan trap extrusions (Vonhof and Smit, 1997), that seems to be caused by addition of low (hotspot) $^{87}Sr/^{86}Sr$ to the Sr reservoir in the oceans. Yet the corresponding curve across the P/T boundary (Korte et al., 2003) shows a strong increase instead, that would be difficult to explain by Siberian trap basalt extrusions.

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