



Meteorite Impacts as Triggers to LIPs and Hotspots

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The combined effects of impact melting, enhanced by sub-crater decompression melting in computer simulations of ~ 200 km craters produce characteristic high melt volumes of approximately 106 km^3 derived from the uppermost ~ 150 km of the Earth's mantle. The overlap between expected frequency of such impact events combined with the similarity in magma volumes of large igneous provinces (LIPs) suggests that large meteorite impacts may be capable of triggering LIPs and mantle hotspots from a point source which is subsequently buried, as eg: oceanic plateaus. There are two main aspects to test this idea; firstly what are the distinctive macroscopic criteria predicted from an impact model, and secondly, how may these be recognised in the geological record of the Earth. We illustrate the impact melting potential with a detailed model for the Ontong Java Plateau, and use this as a discussion point to assess predicted geochemical, geophysical and geological characteristics of such a process. These might include; geotherms and melting; mixed volcanic versus impact signals; paucity of shock relative to thermal features; distal deposits, spherule beds, ejecta and ash layers; where to look?; proximal-distal-global markers; ocean drill cores and sequence stratigraphy etc. Steeper geotherms and higher impact rates would also suggest that this process be particularly effective during the early Earth history, and komatiitic melts were more abundant.