MASS KILLINGS AND DETECTION OF IMPACTS: Digby J. McLaren,
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Highly energetic bolide impacts occur and their flux is
known. For larger bodies the energy release is greater than
for any other short-term global phenomenon. Such impacts
produce or release a large variety of shock induced changes
including major atmospheric, sedimentologic, seismic and
volcanic events. These events must necessarily leave a variety
of records in the stratigraphic column: (1) biological effects
including mass killings resulting in major changes in
population density and reduction or extinction of many
taxonomic groups, followed by characteristic patterns of
faunal and floral replacement; (2) stratigraphic and
sedimentologic effects commonly manifest as a break in the
succession—a diastem with time missing, erosion surfaces and
facies changes, tsunami or storm deposits, or major slumping
involving reworking of previously deposited sediments and
derived fossils; (3) geochemical changes which may be
associated with a global reduction event leading to
precipitation of siderophiles at or near the horizon, possible
hydrothermal activity, and enrichment of platinum metals
including iridium—although these are rarely preserved in
non-oceanic sedimentary environments.

Of these effects mass killings, marked by large-scale
loss of biomass, are the most easily detected evidence in the
field but must be manifest on a near-global scale. Such mass
killings that appear to be approximately synchronous and
involve disappearance of biomass at a bedding plane in many
sedimentologically independent sections globally suggest a
common cause and probable synchronicity. Diversity changes and
taxa plots are of dubious value in detecting events and cannot
identify an event horizon. The horizon at which a species
became extinct is theoretically unknowable. Survivors after a
major biomass disappearance are not uncommon. Mass killings
identify an horizon which may be examined for evidence of
cause. Geochemical markers may be ephemeral and absence may
not be significant. There appears to be no reason why ongoing
phenomena such as climate and sea-level changes are primary
causes of anomalous episodic events.