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Did Dark Matter Kill the Dinosaurs?

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Potential links between astrophysical sources, such as gamma ray bursts and supernovae, and mass extinction events on Earth are of interest in the historical trajectory of life on our planet. There are strong arguments to suggest that these astrophysical sources can have several destructive effects, including depletion of atmospheric ozone and an increase in the radiation dose received by living organisms. Recently, the possibility of galactic Dark Matter (DM) clumps having an affect life on Earth has been of some interest in the literature. In this work, it is shown that when the Earth passes through clumpy DM composed of WIMPs, there is an equivalent dose of $\sim 15.9 \mu\text{Sv}$ imparted to organic tissue when the WIMPs are treated as mutagenic radiation. There will also be an increase to the internal heat flow of the Earth of as much as $\sim 3700 \text{ TW}$, leading to increased flood-basalt volcanism. It is also shown that when a clump of DM with $\sim 1 M_{\odot}$ passes through the solar system, the annihilation and decay of WIMPs can produce a gamma ray flux strong enough to deplete parts of the ozone layer. If WIMPs are found to be a major constituent of DM, these effects (or a combination thereof) could provide an explanation for mass extinction events on Earth.

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