Abstract Submitted
for the PSF11 Meeting of
The American Physical Society

Consequences of intense intermittent astrophysical radiation sources for terrestrial planets[1] ADRIAN MELOTT, University of Kansas — Life on Earth has developed in the context of cosmic radiation backgrounds. This in turn can be a base for comparison with other potential life-bearing planets. Many kinds of strong radiation bursts are possible by astrophysical entities ranging from gamma-ray bursts at cosmological distances to the Sun itself. Many of these present potential hazards to the biosphere: on timescales long compared with human history, the probability of an event intense enough to disrupt life on the land surface or in the oceans becomes large. One of the mechanisms which comes into play even at moderate intensities is the ionization of the Earth's atmosphere, which leads through chemical changes (specifically, depletion of stratospheric ozone) to increased ultraviolet-B flux from the Sun reaching the surface. UVB is extremely hazardous to most life due to its strong absorption by the genetic material DNA and subsequent breaking of chemical bonds. We characterize intensities at the Earth and rates or upper limits on rates. We estimate how often a major extinction-level event is probable given the current state of knowledge. Moderate level events are dominated by the Sun, but the far more severe infrequent events are dominated by gamma-ray bursts and supernovae. So-called "short-hard" gamma-ray bursts are a substantial threat, comparable in magnitude to supernovae and greater than that of the higher-luminosity long bursts considered in most past work. Short bursts may come with little or no warning.

[1]Funded by NASA Astrobiology program

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Date submitted: 13 Sep 2011 Electronic form version 1.4