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Influence of a Galactic Gamma Ray Burst on Ocean Plankton

The hypothesis that one or more biodiversity drops in the Phanerozoic eon, evident in the geological record, might have been caused by the most powerful kind of stellar explosion so far known (Gamma Ray Bursts) has been discussed in several works. These stellar explosions could have left an imprint in the biological evolution on Earth and in other habitable planets. In this work we calculate the short-term lethality that a GRB would produce in the aquatic primary producers on Earth. This effect on life appears because of ultraviolet (UV) re-transmission in the atmosphere of a fraction of the gamma energy, resulting in an intense UV flash capable of penetrating ˜ tens of meters in the water column in the ocean. We focus on the action of the UV flash on phytoplankton, as they are the main contributors to global aquatic primary productivity. Our results suggest that the UV flash could cause an hemispheric reduction of phytoplankton biomass in the upper mixed layer of the World Ocean of around 10%, but this figure can reach up to 25 % for radiation-sensitive picoplankton species, and/or in conditions in which DNA repair mechanisms are inhibited.

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