

Terrestrial Effects of a Nearby Supernova

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Several estimates have been made since 1970s that a relatively nearby supernova explosion could have significant effects on life on the Earth. There is a direct geochemical evidence for such an event at about 2.8 Myr ago, whose distance has been estimated to be around 40 pc (Fields 2004; Knie et al. 1999, 2004; Benitez et al. 2002). Quantitative analysis of the effects of such an event on the Earth's atmosphere have been previously done based on the spectra of SN 1987A (Gehrels et al. 2003; Thomas et al. 2005). This work is the first attempt to understand the overall effects of a nearby supernova based on the spectral energy distribution of a typical 15 solar mass type IIp supernova along with the propagation of cosmic rays and the blast wave. We examine the effects of such an event on Earth's atmosphere and the resulting biological implications. We investigate ozone depletion, the subsequent increase of solar UVB reaching the Earth's surface, and the resulting biological impact.