

Abstract Submitted
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Nanodiamond formation via thermal radiation from an air shock

PAUL DE CARLI, SRI International — Nanodiamonds have recently been found in sediments of Younger Dryas age, about 12,900 years ago. Carbon isotope ratios imply that the source of carbon was terrestrial organic matter and rule out the possibility that the diamond was of cosmic origin, e.g., from an influx of meteorites. The nanodiamonds are associated with mineral spherules (and other shapes) that have compositions and textures consistent with the rapid melting and solidification of local soil. The inferred temperatures are much too high for natural events such as forest fires. Similar deposits of nanodiamond have been found in the 65 million year old K-Pg layer associated with the ca. 200 km diameter Chicxulub impact crater. Nanodiamond have also been reported in the vicinity of the Tunguska event, presumed to be the result of an air shock produced by the interaction of a rapidly moving cosmic body with the Earth's atmosphere. We infer that the nanodiamonds were formed when the thermal radiation from the air shock pyrolyzed surface organic matter. Rapid reaction locally depleted the atmosphere of oxygen and the remaining carbon could condense as nanodiamond. A similar mechanism can be invoked to account for the formation of nanodiamond as a product of the detonation of oxygen-deficient high explosives.

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