Scale and frequency of cooling-drought events by asteroid impact

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Asteroid impacts to the Earth can form global stratospheric soot and sulfate aerosols sourced from target rocks leading to global decreases in sunlight, temperature, and precipitation. Scale of the cooling-drought events is decided by amount of those aerosols. Their amounts vary widely depending on impact location and impact energy. However, impact site variation has not considered for calculation of probability of the cooling-drought events by asteroid impacts. We analyzed climate changes by different size of asteroids hitting various impact locations. Here we show that significant cooling in high-middle latitudes with drought in low and high latitudes occur in frequency of once/7 million years, which decreases to one eighth of previous thought. The cooling-drought events by bolide impacts become more rare events for humans, but can occur during the duration of anthroposphere. Cooling in high-middle latitudes by >5 ˚C on land and drought in low latitudes damage vegetation and agriculture globally, which can induce a significant decrease of number of animals including humans. In order to avoid the disasters, an asteroid orbit should be controlled to hit to the oceans when impacts cannot be avoided, because of low amount of stratospheric aerosol sources inducing cooling in the ocean areas, and a little amount of stratospheric sulfate aerosol formed by impacts.

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