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HUMAN RESILIENCE TO GIANT ASTEROID IMPACT

Abstract

This study aims to review the consequences of the impact of a gigantic asteroid with the Earth and to determine whether humans could survive such a cataclysm. Three survival scenarios have been analyzed, based on the state of the art of the physical phenomena involved, human needs and the capacities and limits of the available technologies for survival.

The possible causes of human annihilation may come from the direct consequences of the impact, linked to the size or the different characteristics of the asteroid. They can also come from the indirect consequences of the impact, such as the struggle for resources, generalized anarchy, or the mental distress of survivors who no longer find the desire to fight for survival in very difficult conditions.

Various parameters have been considered, including the diameter of the asteroid and the location of the impact. In each scenario, the warning time is about ten years before impact, as it is expected for a long period comet arriving from the Oort cloud.

In the first scenario, there is a fall of a hypothetical asteroid 100 km in diameter in the middle of the Pacific. The direct consequences of the impact are too harsh for a sustainable survival and the probability of human extinction is very high.

In the two other scenarios, there is an impact of a 50 km wide asteroid, one into the Atlantic and the other in the East of Asia. In these scenarios, despite difficult external conditions, it is likely that humanity will survive. With the help of specialized underground shelters, humanity can survive the violence of impact and the winter impact. For long-term survival, several solutions are considered. For energy supply, geothermal energy seems to be an interesting solution because it has a long lifespan and is almost continuous. For food, insect farming and hydroponics using artificial lighting are viable and inexpensive ways to meet food requirements. Psychological conditions, social organizations and human factors issues also are examined and discussed.

After such cataclysmic events, the survival of complex life forms and human species may be very difficult. The preservation of species and humanity may nevertheless be ensured if extraterrestrial settlements with full autonomy capabilities have been carried out before.