Impact hazards of meter size meteorites

N. Nogami

International Meteor Organization, Japan

Introduction

So far impact hazards of NEO (Near Earth Object) have frequently been discussed because of those serious and fatal stories to modern civil life. On the other hand, however, as one factor of natural disaster for considering countermeasures an impact phenomenon has been neglected because it may happen too rare, once per ten thousands or a few million years, and too hard to prevent it by the latest technology. [1] These NEO are size of several ten meters at smallest. But smaller size meteorites have more frequent chance to impact to the Earth and may give some unexpected heavy damage to disregard. This presentation treats meter size meteorites impact frequency, damage and some hints of countermeasures for them.

Impact frequency and damage level of meter size meteorites

Frequency of focused meteor size in this presentation is from thousands to several years. Some case histories including impact damages by the meteorites will be mentioned. Especially as frequency level of less than one hundred years are close to lifetime of an industrial factory or civil community, one will understand to take into account this kind of impact as a reality. On talking about a frequency, some people may focus on "probability of some region like a county, area or a continent". This presentation mentioned briefly a couple of past impacts and impact probability in Japan where is quite limited small area in the world.

In addition, damage records from these case histories will be good reference to considering and imaging damage effect for them. Here the word "damage" contains primary one and secondary one. The former means a crater, shock wave, mechanical damage, heat damage and so on. The later includes trajectories from the crater, missiles of debris broken by shock wave, leakage of harmful materials by the impact and so on.

Countermeasures for an impact

By applying the knowledge of loss prevention in the safety engineering, some key points of countermeasure for impact of titled size meteorites are proposed. [2]

Even if some these knowledge treat lower energy level of trajectories, shock wave and so on, treatment from engineering stand point will be useful and worthwhile. Some idea may be utilized for loss prevention in industrial works and plants, and architectures.

References

[1] "On state-of-the-art of the system preparation for large scale damage happening at the third and fourth nuclear reactors in Takahama nuclear power plant" -A material for suppkementary explanation- March. 2014, Kansai Electric company. *In Japanese*

[2] "Lee's loss prevention in the process industries hazards identification, assessment and control" Third ed., Butterworth-Heinemann. 2005.