

## Only one case for collision prediction to the Earth, pinpointed collision site and recovery of fragment: Almahatta Sitta

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There are numbers of a large or small asteroid around the Earth. Parts of them may collide on the Earth and cause a cataclysm for human beings. We recognized the fact through an unexpected meteorite fall occurred at Russia on February 15th. Now, researchers mainly from U.S.A., European countries and Japan organize an observation network and try to find an asteroid may come near or collide on the Earth. The observation network found an asteroid before it fell in to the Earth and predicted its fall trajectory successfully [1] although only a few people in Japan know this event.

Catalina Sky Survey (Arizona state, U.S.A.) joining the observation network found an asteroid (named as 2008 TC<sub>3</sub> later) on October 6th 06:39 (UTC) 2008. The staff at Catalina Sky Survey calculated its trajectory immediately, and realized that 2008 TC<sub>3</sub> was on collision course to the Earth. They sent this information to NASA, and staff at NASA calculated its trajectory more precisely. Finally, they concluded that 2008 TC<sub>3</sub> would fall at the Nubian Desert of northern Sudan on October 7th 02:45 (UTC). Expected size of 2008 TC<sub>3</sub> was from 2 to 5 m. NASA sent this information not only to U.S.A. government but also several countries. Many observatories and astronomers started to track 2008 TC<sub>3</sub> based on the information. 2008 TC<sub>3</sub> entered the atmosphere around northern Sudan at expected time, October 7th 02:45:40, and exploded at an altitude of 37 km five seconds later. A satellite and pilot of international airline saw the explosion. Expected magnitude of the explosion is about 1 kiloton. Researchers mainly from Sudan University and NASA organized a search party to find a fragment of 2008 TC<sub>3</sub> after it fell. Finally, they recovered many fragments (totally about 4 kg). There were no landmarks except for rail way station around the region where they found the fragments. The name of the rail way station is Almahatta Sitta in Arabic. Accordingly, the recovered fragment was named Almahatta Sitta as a meteorite. 2008 TC<sub>3</sub> is the first asteroid that was observed and its trajectory was determined before the fall, and its fragment was recovered.

The recovered meteorites were distributed to many researchers around the world to study its petrological, mineralogical and geochemical features. Based on these studies, 2008 TC<sub>3</sub> consists mainly of achondrite, ureilite and minor H, E and C type chondrites, indicating that 2008 TC<sub>3</sub> was an inhomogeneous asteroid. It is expected that an original ureilite parent-body was destroyed once by planet collision, and subsequently its fragments and other fragments originating from H, E and C type chondrite parent-bodies accumulated each other, thus leading to form 2008 TC<sub>3</sub> [2]. In other words, 2008 TC<sub>3</sub> would be similar to Itokawa investigated by HAYABUSA [3].

### Reference

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