

## The new NEO survey project - Chinese Near Earth Object Survey (CNEOS).

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### Abstract

From July 16 to 22, 1994, 21 fragments of comet Shoemaker-Levy 9 impacted Jupiter with a velocity of about 60 km/s, which was the first time to show a grand collision between celestial bodies to human being. The impact makes us known definitely that the earth is faced with the small but serious threat of Near Earth Objects (NEOs). In 1995, Chinese scientists proposed a plan of Chinese Near Earth Object Survey (CNEOS) in the conference on NEOs held at the World Headquarters of United Nations in New York. In 2005, the progress of CNEOS was reported on the scientific and technical subcommittee 42 session of committee on the peaceful uses of outer space. During the past 7 years, CNEOS proceeded from selecting observational site, manufacturing telescope and CCD detector, carrying out observation, reducing mass data, and assessing impact risk from NEOs.

In 2002, an NEO named 2002 MN had a closer brush with the earth in June but was not detected until three days later. In fact, many NEOs could move into the earth's neighborhood. Will these so-called potential hazardous asteroids (PHAs) be the terminator of mankind? Until December 18, 2007, only 900 PHAs were found, and more are not found yet. There are many NEOs Survey projects under the NASA's financial support having been carried out all over the world, e.g. LINEAR, Spacewatch, etc. NASA had drawn a Spaceguard goal of discovering 90% of all NEOs with diameters greater than 1 km by the end of 2008. In 2007, the Spaceguard goal was changed to detect, track, catalogue, and characterize 90% of the potentially hazardous objects (PHOs) measuring at least 140 m in diameter by the end of 2020. JPL of NASA and Pisa University had carried out risk assessment of NEOs independently.

Under the financial support of Ministry Of Sciences and Technology, Chinese Academy of Sciences and Jiangsu Province of China, the project of CNEOS, including selecting observational site, manufacturing telescope and CCD detector, had been put in practice from 1998. Though 2 years evaluation of observational site, Xuyi station is decided as the right site of CNEOS. Several parameters, e.g. the number of astronomical observing night, night sky background, seeing, etc, reach the requirement of CNEOS. The telescope of CNEOS is a 1.04/1.20/1.80 m Schmidt telescope (see Figure



Figure 1: Telescope of CNEOS.

1), equipped with a 4K by 4K CCD detector with drift-scanning function.

After the setup and adjustment of CNEOS telescope, the test observation is carried out from October of 2006. Because CNEOS is a large field of view (FoV) and little focal ratio system, it can produce more than 22 G image data in an observing night. We develop algorithms of pretreatment of astronomical image, extracting objects from image, and cross-identification of objects, then discuss the methods of identifying and classifying of move objects, establishes software to realize the reduction of the mass data. Until March of 2008, CNEOS had found 431 new asteroids including an Apollo-type NEO — “2007 JW2” and a Jupiter-family periodic comet — “P/2007 S1 (Zhao)”. In this period, the observation quantity of CNEOS ranked the 8th among all 378 asteroid observation plans, and the accuracy of positional reduction was also quite well.

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