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After more than two years of renovation work, the Tianlongshan Caves in North China's Shanxi province reopened to the public in August, displaying their Buddhist sculptures and art.

The renovation project, which cost 10 million yuan (\$1.5 million), is expected to help the more than 1,400-year-old caves avoid threats from falling rocks and erosion.

The caves contain some of the finest Buddhist artworks in China. But parts of many sculptures are missing and are either in private collections or art institutions abroad, according to the Center for the Art of East Asia (CAEA) at Chicago University.

With the help of 3D technology, the missing heads of a few Buddha statues from the caves have been reunited with their bodies digitally. The Tianlongshan Caves management worked with Chicago University for four years on the digital reconstruction of the damaged sculptures housed in 25 caves in Shanxi.

The missing heads were stolen at different times, starting from the 1920s, and sold in the international art market, according to officials from the Tianlongshan Caves management.

A current show at Beijing's OCAT Institute shows the caves and completed Buddha statues via 3D and virtual reality. The show runs until Dec 31.

The Tianlongshan Caves, nestled on a mountain on the outskirts of the provincial capital of Taiyuan, have about 500 sculptures.

The show displays photos and videos with full Buddha sculptures. For instance, the missing head from a Buddha statue that should have been in Cave No 14 but is now in the British Museum was scanned and then matched with a 3D model of the full body in the cave to complete the statue digitally. Cave No 14 was built during the Tang Dynasty (AD 618-907).

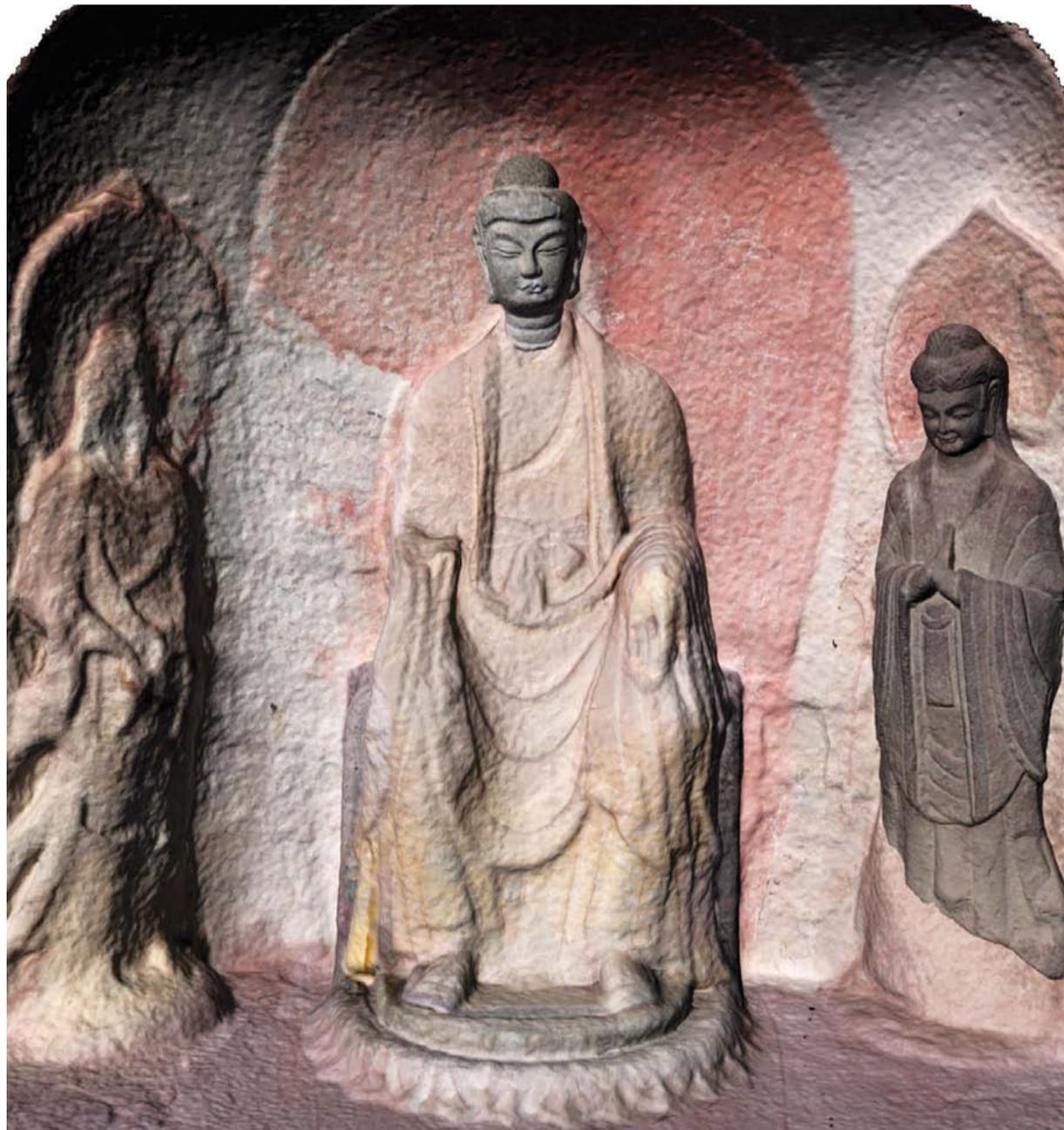
"Many of the Buddha heads are outside China — about 150 fragmented sculptures have been located with the aid of Chicago University," said Yu Hao, director of the management office of the Tianlongshan Caves.

He said he has yet to travel to see the missing sculptures that are displayed in overseas museums including the Metropolitan Museum of Art in New York, the Tokyo National Museum and the British Museum.

Katherine Tsiang, associate director of CAEA, said that since 2013 her team has scanned 103 fragmented sculptures — heads, hands and relief carvings — in the United States, Europe and Japan. But new pieces of the

# 3D reveals complete sculptures

Virtual reality technology lets Tianlongshan Caves digitally replace the missing heads of Buddhist statues for Beijing show



**Buddha statues** are displayed at the exhibition in Beijing using 3D and virtual reality technologies. These are relics from the Tianlongshan Caves in North China's Shanxi province. A file photo (above left) shows the damaged statues in Cave No 14.

PHOTOS PROVIDED TO CHINA DAILY

sculptures keep emerging.

"We have to continue working on finding them because there are always new ones," she said.

Lin Wei-cheng, who is in charge of communication with museums on the CAEA team, said about 130 pieces were located in 31 places around the world. Harvard Art Museums have the biggest collection, with more than 20 pieces.

He said that some art dealers and museums were willing to let the team scan such Buddha sculptures in their collections, while others required time to get permission.

It took Lin and his colleagues two years to get permission from the Tokyo National Museum to scan Buddha heads stored there.

But even though they had the data of scanned heads, and the management office of the Tianlongshan Caves had that of the bodies, they still failed to restore a complete Buddha sculpture because of missing parts such as the neck.

Yu, the office director, said that except for four statues in Cave No 9 that have remained intact, the other major sculptures of the Tianlongshan Caves have been damaged.

"The Buddha sculptures are regarded by experts as among the best of those built in the Tang Dynasty," said Yu, who started working at the caves in 1997.

Construction of the Tianlongshan Caves began in the Eastern Wei Dynasty (AD 534-550) when the area of Jinyang was a secondary capital of China. The caves flourished during the Tang Dynasty.

In 1922, articles published by Japanese scholars and photos of the Tianlongshan Caves revealed by Tomura Tajiro, a Japanese art professor, attracted international attention, resulting in looting of the caves by antique dealers.

Yamanaka Sadajiro, a Japanese art dealer who was then the biggest antique dealer selling Chinese and Japanese art, took 45 Buddha heads in 1926, according to previous reports.

"To some extent, the Tianlongshan Caves are better known outside China due to the collection in museums across the world," said Yu.

He said the management is now preparing a national touring show for 2018 that will virtually display the reconstructed sculptures. The exhibition is expected to go to the US and Japan in 2019.

Yu said the show will include sculpture pieces on loan from Chinese collector Xu Peng who bought back a Buddha head auctioned at Christie's in New York in 2008.

Two other such head sculptures were brought back to the country in 2003 and are now displayed at the National Museum of China.