China's Aerospace Research Institute - Jimu No. 1, Type III, high-altitude aerostat

Peter Lobner, 6 September 2022

The Aerospace Research Institute of the Chinese Academy of Sciences developed a high-altitude, tethered aerostat, known as the Jimu No. 1, Type III, to carry research equipment to high altitude from a base camp on the Qinghai-Tibet Plateau. This aerostat is the latest and largest of three aerostats that have been developed to collect atmospheric data and study the effects of climate change on the plateau. The first of these aerostats was launched in 2019 and reached a height of 7,003 meters (22,976 ft).

The Jimu No. 1, Type III aerostat weighs 2.625 metric tons (2.9 tons) and has an envelope with a volume of 9,060 m^3 (319,951 ft^3) and fixed, inverted Y-tail fins. It is tethered to a mooring mast structure that weighed 90 metric tons (99 tons). The envelope is made of advanced composite fabric that can withstand temperatures as low as -70º C (- 94º F) and has good resistance to oxidation from ozone.

Jimu No.1 at the high-altitude launch site in Tibet.
Source: Chinese Academy of Sciences

The 64-member team that employed the Jimu No. 1, Type III aerostat was comprised of researchers from the Chinese Academy of Sciences, including the Institute of Tibetan Plateau Research, the Aerospace Information Research Institute and the Changchun Institute of Optics, Fine Mechanics and Physics. This was one of 16 research teams that were funded as part of China's "Earth Summit Mission 2022" program.

In May 2022, the team deployed the Jimu No. 1, Type III aerostat to conduct research above its base camp at an elevation of 4,300 meters (14,108 ft) on the Qinghai-Tibet Plateau, near Mount Everest (Qomolangma) and the China-Nepal border. The aerostat carried equipment to record data related to atmosphere composition and high-altitude water vapor transmission processes. The measured data included black carbon, dust, carbon dioxide and methane, which are key elements in studying environmental changes on the Qinghai-Tibet Plateau, in particular regional water cycles and changes in atmospheric composition. Researchers hope to develop insights into how westerlies, winds that blow from the west toward the east in the middle latitudes between 30 and 60 degrees, can affect the environment on the Qinghai-Tibet Plateau.

On Sunday, 15 May 2022, the Jimu No. 1 tethered aerostat was launched at 1:26 a.m. Beijing time and ascended at an initial rate of 30 meters/sec (98.4 ft/sec). At 4:40 a.m., Jimu No.1, reached a new world record altitude of 9,032 meters (29,633 ft). At maximum altitude, the aerostat was 4,732 m (15,525 ft) above the elevation of its launch point, and above the peak of Mount Everest (8,849 m / 29,032 ft).

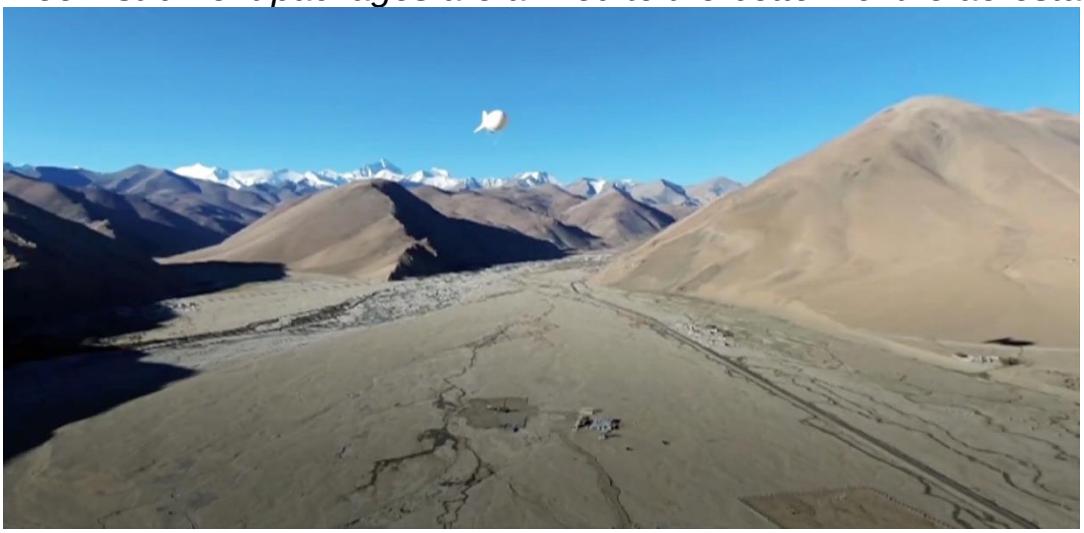
The existing FAI-ratified Airship Sub-class B world absolute altitude record was set on 17 August 2006 by Stanislaw Fuodoroff flying the Auger Rosaerosystems Au-35 *Polar Goose* thermal airship to an altitude of 8,180 m (26,837 ft).

Source: China Daily

Jimu No.1 and control center at the launch site.
Source: Ecns.com, photo by Xinhua/Sun Fei, 14 May 2022

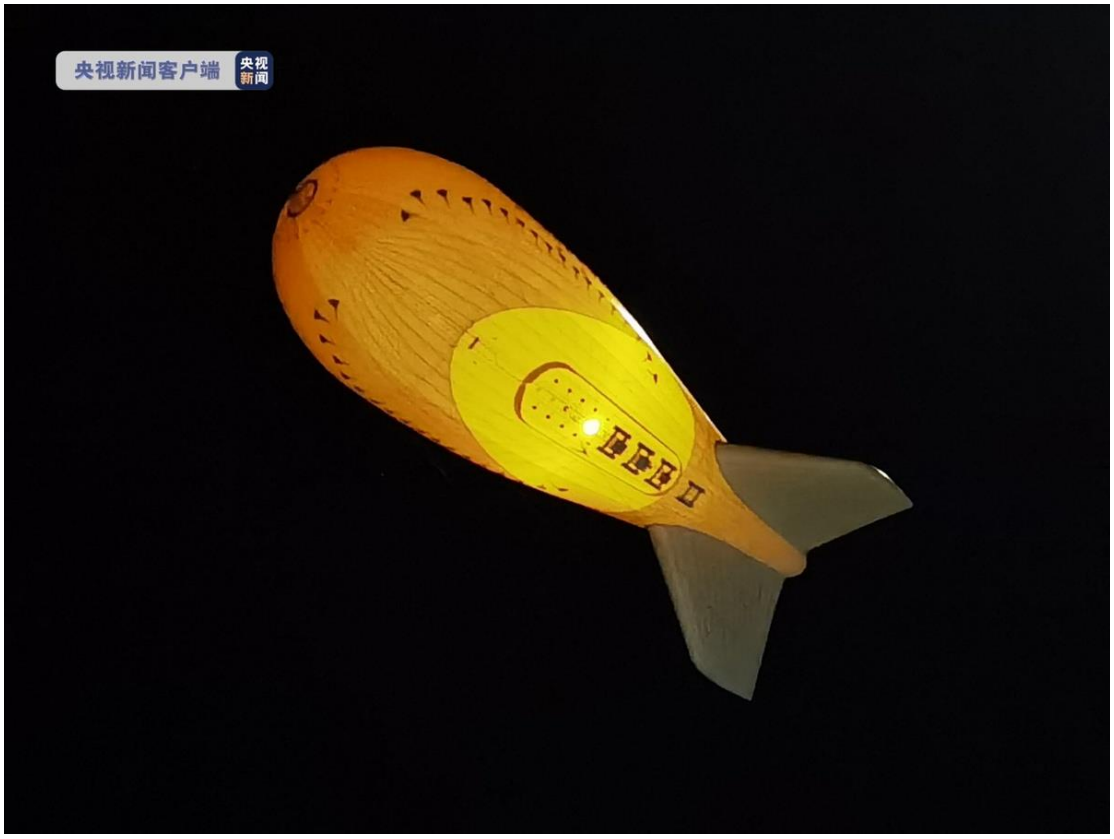
Jimu No.1 tethered and flying above the mooring platform.

Three instrument packages are affixed to the bottom of the aerostat.



Jimu No.1 in flight above the base camp on the Qinghai-Tibet plateau. Source, three photos: Screenshots from CGTN.com video

Jimu No.1 at its mooring tower prior to a night launch.
Source: SUN Fei/Xinhua



Jimu No.1 night launch. Source: CCTV News

Jimu No.1 night launch. Source: CCTV News

Jimu No.1 in flight. Source: Screenshot from CGTN.com video

For more information

- Zhang Zhihao, “Chinese scientists break aerostat altitude record,” China Daily, 15 May 2022: https://www.chinadaily.com.cn/a/202205/15/WS6280863aa310fd2b29e5cc2a.html
- “Chinese-made Floating Airship Reaches World Record Altitude of 9,032 Meters,” Chinese Academy of Sciences, 16 May 2022: https://english.cas.cn/newsroom/mutimedia_news/202205/t20220516_305463.shtml

Video

- “China's self-developed floating airship breaks record,” (1:08 minutes), China Daily, 15 May 2022: https://www.youtube.com/watch?v=BncC6cJWwPM

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