



## Chinese Advancement in Hypersonic Aircraft

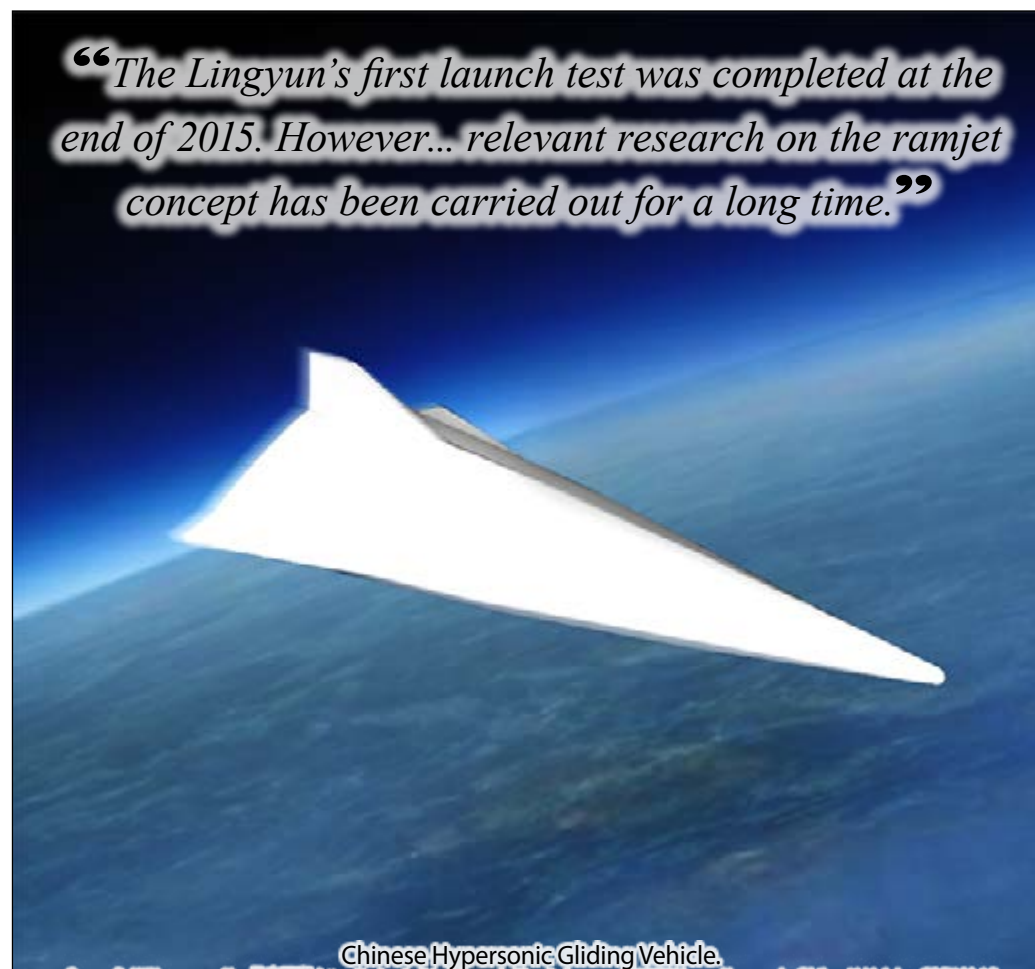
**OE Watch Commentary:** In May, photos of a hypersonic test vehicle on display at a civil-military exhibition in Beijing stoked speculation about China's progress in developing the technology. Hypersonics, generally defined as vehicles capable of speed in excess of Mach 5 (3,836 mph at sea level), are regarded as an important next-generation technology, but pose significant challenges due to the extreme heat and stresses created by the high speed.

China has been exploring manned and unmanned hypersonic platforms for ISR or strike capabilities since the 1980s, but information on tests was scarce until the mid-2010s, when China began to regularly test its DF-ZF wave-riding missile. Development of the "Lingyun" by China Aerospace Science & Industry Corp's (CASIC) Third Academy, the National University of Defense Technology and Harbin University began in 2005, and may represent a parallel but different element of hypersonic vehicle development as reported by the accompanying excerpted article from *Sina Military*.

Notably, the "Lingyun" near-space Hypersonic Common Use Test Flight Platform [凌云临近空间高超声速通用试飞平台], to give it its full name, has four ramjet-like scoops and is pictured as capable of vertical launch from a rail system. Ramjets engines are typically a requirement for air-breathing (non-ballistic) hypersonic platforms, and could offer platforms with much greater range compared to the DF-ZF. Scramjets, which operate at even higher speeds, have fewer parts but greater design requirements. Additionally, the platform's external resemblance to the Russian Kinzhal (Dagger) air launched hypersonic missile has stoked speculation that the Lingyun is a testbed for a similar capability.

Given the significant engineering challenges posed by hypersonics, China has needed to invest in large R&D projects. In March, an interview with China Central Television (CCTV) revealed that a Key State Laboratory under the Chinese Academy of Sciences is building what will be the world's fastest hypersonic wind tunnel, as noted in the excerpted article from *Xinhua*. China also appears to be following historic precedent by placing senior scientists familiar with strategic weapons programs in key leadership positions. The 2017 appointment of Major General Deng Xiaogang [邓小刚] to be Commandant of the National University of Defense Technology, for example, is a perhaps an indication of the importance that the PLA accords to hypersonic technology. Deng, who has had a lengthy academic and research career, is an expert in the mathematical modeling (specifically computational fluid dynamics) vital to hypersonic development.

China, Russia and the United States are all engaged in expansive hypersonic systems research programs. For China in particular, the system offers a potential way to avoid anti-missile defense systems, or to provide faster long-range strike. The appearance of platforms such as the Lingyun, despite being a testbed, are important markers of China's progress with this technology. **End OE Watch Commentary (Wood)**



Chinese Hypersonic Gliding Vehicle.  
Source: By Wikimedia User 果壳军事, [https://upload.wikimedia.org/wikipedia/commons/4/49/Chinese\\_Hypersonic\\_Gliding\\_Vehicle.jpg](https://upload.wikimedia.org/wikipedia/commons/4/49/Chinese_Hypersonic_Gliding_Vehicle.jpg), CC BY-SA 4.0

**Source:** “中国公开临近空间高超音速试飞平台 3年前完成首射 (“China’s Publicizes Nearspace Hypersonic Test Flight Platform, Completed Initial Test Flight 3 Years Before”),” *Sina Military*, 24 May 2018. <http://mil.news.sina.com.cn/jssd/2018-05-24/doc-ihaysvix6355941.shtml>

*According to public information, the Lingyun’s first launch test was completed at the end of 2015. However, as early as around 2005, a large number of scientific research institutes such as the China Aerospace Science and Industry Third Hospital, as well as national defense and science and technology universities, Harbin Institute of Technology and other military and local colleges and universities appeared in various academic journals, indicating that relevant research on the ramjet concept has been carried out for a long time.*

*As mentioned earlier, its main defense unit, the National University of Science and Technology of China, has carried out relevant preparatory studies very early. It is precisely because of outstanding achievements in this field that in November 2017, the leader of the team, Prof. Wang Zhenguo [王振国], was elected to be a member of the Chinese Academy of Engineering.*

**Source:** “China builds world’s fastest wind tunnel to spur spaceplane development,” *Xinhua*, 19 March 2018. [http://www.xinhuanet.com/english/2018-03/19/c\\_137050751.htm](http://www.xinhuanet.com/english/2018-03/19/c_137050751.htm)

*China is building the world’s fastest hypersonic wind tunnel to help with the development of spaceplanes. Han Guilai, a researcher with China’s State Key Laboratory of High Temperature Gas Dynamics of the Chinese Academy of Sciences (CAS) said the current wind tunnel could simulate flights ranging from Mach 5 to 9. Researchers from CAS in Beijing have successfully tested one hypersonic plane in a wind tunnel at such speeds. The new tunnel will help China to take the lead on wind tunnel building, though competition from other countries is still fierce, according to Han.*