NASIC OSINT Topic Report

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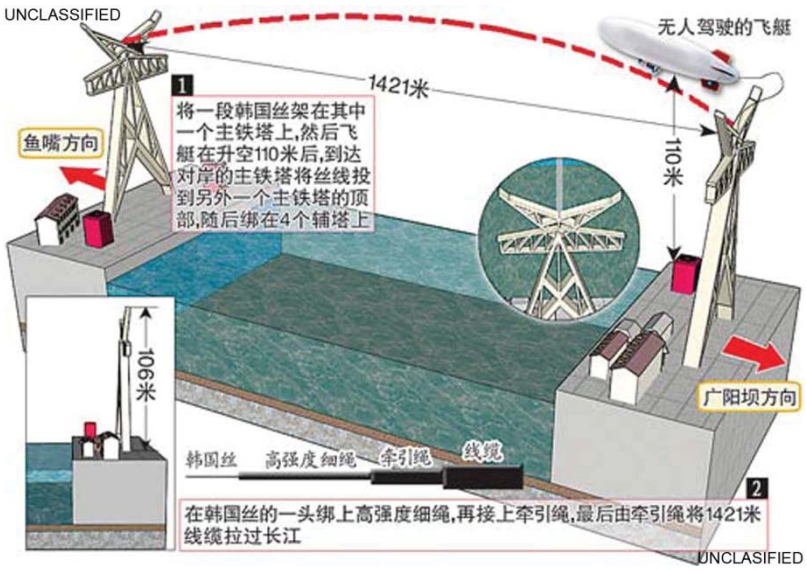
(U) Current and Potential Applications of Chinese Aerostats (Airships)



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(U) Since the 1970s, the studies of aerostats and their subcategory of airships have become "hot topics" in the aviation fields of research in many countries. More Chinese scientists and researchers have become engaged in airship research, especially in the area of military applications.[1]

(U) Airships and Disaster Relief

(U) Interest in the utility of airships was heightened after the 2008 Wenchuan earthquake and the problems faced by relief workers. There were serious bottlenecks in delivering the equipment and supplies needed by relief workers. The disaster area's terrain was precipitous. Highways were heavily damaged or blocked by landslides, making it impossible for rescue and excavating equipment to be rushed to the disaster area.[2]

(U) The Chinese open source press reported concerns that their country's transportation system was insufficient, relying too heavily on infrastructure such as roads, railroads, and airports. In the event of natural disaster or war, any damage to these infrastructures would severely restrict split-second responses. China's transportation system needed to be improved, a fact underscored by the problems encountered in earthquake relief work. Press reports indicated a need for a "new" transportation vehicle, one that could fly over geographical barriers, carry large payloads, function safely and economically, and have an increased degree-of-freedom movement. The solution suggested was a new helium airship.[3]

(U) Airships are not constrained by geographical conditions, provided that there are not severe winds. They can reach any disaster area, and can hover and leave the area quite close to the disaster area. Airships can go around blocked paths and roadways, and brave rainstorms to rescue stricken people promptly, thus reducing casualties and loss. The airship's ability to vertically take off and land allows it to reach remote areas not accessible by fixed wing aircraft. It can deliver fresh water, medicines, as well as engineering machinery and large-scale disaster relief equipment. The airship can stay in an area for long periods of time, facilitating 24-hour long searches and deliveries to disaster-stricken people (something helicopters are not able to achieve).[4]

(U) Airships could also serve remote sensing telemetry and command headquarters functions for earthquake relief work. In cloudy weather, airplanes and satellites cannot promptly obtain clear remote sensing images, but an airship can cruise for long periods of time under cloud layers. With the installation of high resolution cameras, remote sensing equipment and so on, airships can provide all-weather 24-hour monitoring of disaster areas. They can acquire remote sensing images fast, and provide continuous, systematic, and comprehensive initial disaster area monitoring data for earthquake emergency relief work management and for policy-making purposes. They could also serve as an operational command headquarters to implement on-the-

spot management and increase the efficiency and security of large scale aerial transport airdrops.[5]

(U) Airships as Construction Equipment

(U) Airships can also be used as construction equipment. The stability of flight provided by airships allows them to move and deliver construction components in a manner not available by other means. Use of airships in construction also allows for more maneuverability and efficiency for construction. The Chinese have been experimenting with moving power lines and suspension bridge wires with airships. By moving the cables with airships, potential damage to the cable and time spent moving the cable is minimized.[6] (See Figure 1)

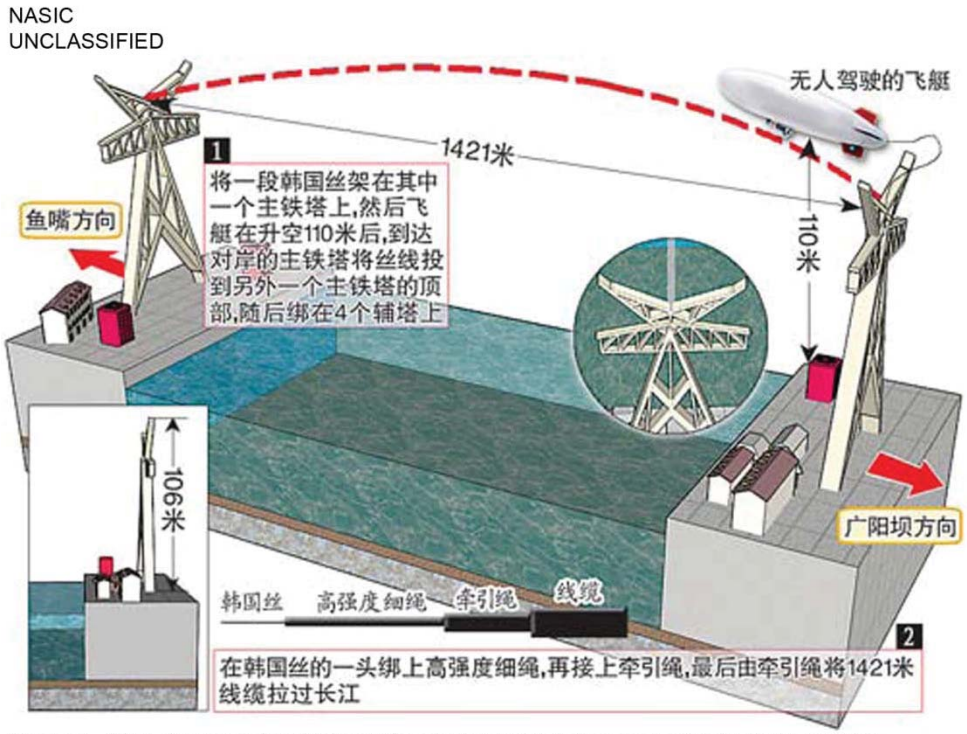

Figure 1. (U) A diagram of an airship pulling high tension wire across a body of water that is 110 meters high, and 1421 meters wide, 7 April 2008[7]

(U) In May 2009 an airship was used to assist in the installation of electric power lines in the area around the mountain peak of Taishan, located near Yingxiu. Taishan is an unstable area covered in scree. It is unsuitable for the use of explosives and is an unsafe area for construction crews. By using an airship, power cables, ropes and drop lines were installed the length of the national highway that spans the mountain.[8] (See Figure 2)

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Figure 2. (U) An airship surveying power line reconstruction efforts in Sichuan, China, 10 May 2009[9]

(U) A reporter from Sohu news interviewed Chengdu Airship Company chief designer Kuang Tianjin in August 2006. Kuang Tianjin reported that their airship had flown over the Bird's Nest and other Chinese Olympic sites to take pictures of the construction which was then underway. (See Figure 3) Using an airship(s) to provide security and telecast support during the Olympic Games had been mentioned, but open source coverage did not indicate airships were utilized during the Games.[10]

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Figure 3. (U) Chengdu Airship ST-3 flying over the Beijing Olympic Stadium's Bird's Nest during construction phase - 10 Aug 2006.[11]

(U) Military Potential of Superaltitude Airship Platforms

(U) Superaltitude airships are being considered for use in early-warning detection to supplement existing early warning detection platforms.

(U) Based on the differences of vertical altitude from the ground (i.e. true altitude), the military space suitable for aircraft or airship flight is usually divided into:

- minimum altitude (below 100m)
- low altitude (100 – 1000m)
- medium altitude (1000 – 7000m)
- upper air (7000 – 15,000m)
- superaltitude (above 15km)

(U) Altitude of 20 – 100km is customarily called "near space." Superaltitude, especially superaltitude above 20km, has the characteristics of thin air and little air turbulence, steady wind speed, not much dust, sufficient illumination and so on, and compared with the troposphere, airship platforms in superaltitude are highly stable, easy to control, and highly efficient at obtaining light energy. Along with continuous developments in high-precision spinning and weaving, highly effective anti-aging coatings, airship control, and other technologies, superaltitude airship applications and theory are increasingly mature; application and testing steps are continuously accelerating; and many countries are taking applied research on superaltitude airships more and more seriously, particularly applications in the military realm.

(U) Analysis of advantages of superaltitude airship early-warning detection platforms

(U) Superaltitude airship early-warning detection platforms can avoid the orbit selection limitations of space-based platforms, and the high fuel oil consumption limitations of aviation early-warning detection platforms. Their coverage area is greater than that of ground –based platforms. Their superiority is mainly manifested in the following several aspects:

1. (U) Large early warning surveillance area

(U) Theoretically speaking, superaltitude airship early-warning detection platforms have good three-dimensional effects. Although their coverage area is not as broad as that of space platforms, their detection range is much greater than that of aviation platforms and ground platforms for campaign and tactical regional characteristic applications. For example, if airship early-warning detection platforms are deployed at a 20km altitude, their ground or sea surface target detection range diameter may be greater than 1100km; if the early warning detection target is an aviation target at about 10km altitude, then their detection range diameter may further expand to above 1900km.

2. (U) High survivability

(U) Superaltitude airship early-warning detection platforms are usually made of nonmetallic materials, and use solar energy or chemical energy for energy systems; their radar return, infrared reflection and visible light echo areas are very small (RCS is only about 0.05); and moreover, while superaltitude airship early-warning detection platforms operate, they generally do not move or their traveling speed is very slow, and the Doppler effect is minimal, so it is very difficult for conventional detectors with different kinds of mechanism to discover their existence. In addition, if superaltitude airship early-warning detection platforms are deployed at altitudes higher than 25km, they can surpass the highest ceilings of most combat aircraft, and surpass the highest attack altitude of most antiaircraft fire; in addition they use a multi-cell type gasification structure, so the probability of being damaged in wartime is very low.

3. (U) Good early-warning detection endurance

(U) Superaltitude airship early-warning detection platforms may deploy stably above war zones, and are nearer to targets, and can provide all-weather, all-time continuous and reliable early-warning detection of ground, sea or air [targets]. In comparison, elliptical-orbit early warning (reconnaissance) satellites are limited by revisiting cycles, and cannot provide continuous early warning information on a specific area. Early warning satellites that operate in a geosynchronous orbit at 36,000km are too far from their targets, so coordination with low-to-medium orbit satellites is usually necessary to obtain highly accurate target information. It is also hard for aviation early warning devices limited by cruise duration and navigation air zone air supremacy to provide

continuous and stable early warning information in war zones, particularly in enemy-occupied areas.

4. (U) Low release and operating costs

Superaltitude airship early-warning detection platforms can be recycled and reused in most situations; requirements for release/landing sites are low; and requirements for operating control and support conditions are also low. For example: release/landing of gas-filled airship platforms only requires a site with about 400m × 400m of space; ground-support devices only require a helium filling and reclamation plant, a mooring anchor device and so on; and telemetry, telecommand and wireless communication and information processing terminal devices already present in widespread application may be used as control devices. In comparison, demands for locations of launches of space early-warning detection platforms are high, the setup time is long, a high-thrust launch vehicle is needed to send detection platforms into orbit, operation measurement and control is complex, they generally cannot be recycled or reused, and overall expense is over 40 times higher than that of superaltitude airship early-warning detection platforms. Aviation early-warning detection platform launching and landing location requirements are high, requirements for support conditions are high, there is a lot of equipment and personnel, and their overall expense is over 5 times higher than that of superaltitude airship early-warning detection platforms, but their detection range is actually smaller than that of superaltitude airship early-warning detection platforms.[12]

(U) "The Chinese will have an important opportunity for their airships to be on par with international standards in 2010 to 2020 … [Chinese airship experts deem] …it essential to grasp this opportunity…from a strategic perspective to enhance resource support [for the development of] …solar cells, propulsion control, navigation, positioning and other breakthroughs in key technologies…The airship is economic, safe, environmentally friendly with few restrictions on its air routes… Because of its vertical takeoff and landing, and fixed-point air stationary capabilities, load capacity, low noise, and low energy consumption, it is cost-effective and is very valuable for reconnaissance and surveillance [early warning detection], emergency communications, environmental protection, transportation, [and] disaster prevention and mitigation."[13]

(U) Report Citation

(U) When citing this report, the following format is recommended.

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