CHINESE FRACTIONAL ORBITAL BOMBARDMENT

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INTRODUCTION

Recently The Financial Times reported that the Chinese military tested a new missile system in July and August. A rocket launched from China sent a vehicle into orbital flight, later re-entering the atmosphere and releasing a manoeuvrable glide vehicle travelling at hypersonic speeds.

Long-range missile systems like this can carry nuclear or non-nuclear warheads. With no official explanation from the Chinese government, some American commentators have been quick to assume the worst – a new Chinese ability to bombard the United States from outer space with nuclear weapons.

Such alarmism was abetted by anonymous remarks in the FT claiming China had made "astounding progress", "surprised" US "officials", and that they "have no idea how they did this". Frank Kendall of the US Air Force had previously warned of a vague Chinese orbital bombardment capability, especially because it could bypass US ballistic missile defences. Leaking such information may of course have some political motivations behind them as the Biden administration began a review of missile defence policy in June 2021, followed by the launch of the Nuclear Posture Review process in September 2021.

It all sounds very alarming. A Chinese official claims China merely tested a reusable space vehicle, intensifying uncertainty around what exactly occurred. It is important to note at this stage that there is extremely little information to go on. It may well have been a spaceplane or other missile, rocket, or space vehicle test of some kind, which can have multiple uses and applications and not necessarily only a weapons potential. If it is a spaceplane of some kind, it could well be something akin to the United States' X-37b Orbital Test Vehicle. Any discussion at present must recognise that reliable details of what China actually tested remain scant in the public domain.

The test might not have been for a weapon system, but even if it was something akin to an orbital bombardment system with orbital satellites jettisoning gliding warheads as suggested in reporting, this test does not warrant the seeming alarmism and worst-case thinking it is generating in American circles – one analyst suggested that any Chinese satellite should be assumed to be able to carry a nuclear warhead. This does not change the balance of power in Earth orbit. Instead, it may be a demonstration in the face of the United States' continuing lead in military space technologies. Most importantly, such a technology does not usher in a new phase of American vulnerability to Chinese weapons – US missile defences have never been able to fully protect American cities from nuclear attack. China can overwhelm US ballistic missile defence systems and hold a number of American cities 'hostage' with its existing nuclear missile arsenal.

WHAT IS A "FRACTIONAL ORBITAL BOMBARDMENT SYSTEM" AND WHY WOULD A COUNTRY DEVELOP ONE?

Limited information is available at this time, but it seems unlikely China has developed ground-breaking new technologies with this flight test. It may have demonstrated an orbital bombardment system very similar to that first developed by the Soviet Union in the 1960s. As the space historian Asif Siddiqi has written, the **Fractional Orbital Bombardment System (FOBS)** was fielded to circumvent north-facing American early warning radars to increase the chances of a successful surprise nuclear attack. By making use of a particularly massive rocket, the Soviet weapon had so much fuel it could chart a course the long way around over the South Pole to reach its US targets.

FOBS is different to the long-range nuclear missiles fielded by China, Russia and the United States – **Intercontinental Ballistic Missiles (ICBMs)**. These weapons must fly on an arc across the North Pole to reach their targets. During the Cold War, US

A still from a 1960s American training film shows how military radar sites faced North, with no sensors expecting an attack from the South.

military radars on the ground pointed north, expecting any attacking missiles to appear only from that direction. By flying in from the south, a Soviet FOBS would dodge detection from the ground or sea.

The nuclear warheads carried by an ICBM "hop" above Earth's atmosphere on a ballistic trajectory before falling back to the ground – they simply do not have enough velocity to orbit Earth like a satellite would. Conversely, warheads delivered by a FOBS could theoretically stay in orbit for hours, or even longer.

Analysts are describing the Chinese technology as a **Fractional** Orbital Bombardment System because they are assuming the weapon would only complete a fraction of an orbit – less than one lap around Earth – before firing retro-rockets to slow down and re-enter the atmosphere towards the target. Placing nuclear or other "weapons of mass destruction" into orbit is banned under Article IV of the Outer Space Treaty of 1967. Legal interpretations can vary, but one line of thinking could be that a FOBS would not breach the treaty if it never completed an orbit and is technically "in transit" in space which is practically permitted even if it did carry nuclear weapons.

FOBS was not very useful for the Soviet Union after it had developed submarine-launched nuclear weapons as well as a large amount of ICBMs which could survive any American nuclear attack and therefore guarantee a retaliatory capability. This situation was colloquially referred to as **mutually assured destruction (MAD).** With ground- and sea-based missiles already guaranteeing MAD, Soviet leaders concluded that their space-based FOBS was too expensive to field and maintain for little added capability.

Chinese leaders do have some grounds to fear that American missile defences may be aimed at nullifying China's nuclear deterrent. If that were true, there would be no MAD between the United States and China because it would be neither "mutual" nor "assured." Building a FOBS to counter US defences was considered in China in the 1960s. In that same decade, the United States pursued nuclear-tipped anti-satellite and anti-ballistic missile weapons to attempt to shoot down incoming

nuclear missiles or orbital weapons in the event of war through Program 437.

Missile defences were too expensive to be made at a scale big enough to defeat the hundreds of missiles the Soviet Union could fire at the United States at any given moment. Instead, American leaders justified the system as protection against the nascent Chinese nuclear arsenal. When President Reagan pursued his famous "Star Wars" space-based missile defence program – aimed at making nuclear missiles "obsolete" – Chinese leaders feared that their nuclear arsenal would become useless in only a few decades.

Despite the end of the Cold War, influential Chinese experts have continued to make hyperbolic public comments about American missile defence plans. President George W. Bush withdrew the United States from the Anti-Ballistic Missile Treaty that had been restricting American development of strategic missile defence, leading Chinese weapons engineers to predict that the United States would eventually be able to defend against an attack from the entire Chinese nuclear arsenal of the time.

This history has led some analysts to conclude this was no ordinary space technology test: a technical response to perennial fears of effective missile defence. By combining a FOBS with a **Manoeuvrable Re-Entry Vehicle (MaRV)** or a **Hypersonic Glide Vehicle (HGV),** a technique for manoeuvrable and unpredictable warhead flightpaths in the atmosphere pioneered in the 1980s, China seems to have created a Frankenstein's monster from different Cold War nuclear missile technologies.

WHY A CHINESE FOBS IS NO GAME CHANGER

Today, the United States still positions its missile defence interceptors assuming warheads will pass over the North Pole, although there are too few of them to protect American cities from a major Chinese ICBM nuclear attack anyway. The good news for the United States is that modern early-warning sensors are not limited to the ground or ocean. With a vantage point in outer space, American early warning infrared satellites can detect missile launches and spacecraft burns from almost anywhere on or above Earth. The United States possesses the most widespread and sophisticated **Space Situational Awareness (SSA)** capability, tracking objects in orbits with radars, optical telescopes, and signals detection. Unlike the Soviet Union in the 1960s, China has little-to no chance of launching a complete surprise nuclear attack on the United States.

FOBS, if that is indeed what China has tested, does not change the Chinese military's ability to annihilate Los Angeles with nuclear fire. American cities are not in a new era of vulnerability. Since the Cold War, China has fielded several dozen ICBMs that can target the contiguous United States with fusion bombs. China's existing arsenal can do this faster than FOBS can, and are cheaper to do at scale with countermeasures that can overwhelm existing defences. China is increasing its traditional nuclear force with new missile silos and submarine launched nuclear weapons.

As argued by anonymous sources in the FT article, the ability of the warhead to manoeuvre at hypersonic speeds in the upper atmosphere is important as it can create unpredictability in the mind of the victims or bypass missile defence systems. Traditional ballistic warheads fall along predictable trajectories based on velocity and gravity. Yet, a manoeuvring capability is irrelevant because defences against a nuclear ballistic missile attack do not work in the first place. FOBS requires many dozens if not a few hundred launchers and vehicles to provide a truly unpredictable strike capability that could launch at any time against any target and survive an anti-satellite weapons campaign against them in their short orbital flight time.

In the nuclear war calculations between the United States and China, no planner should seriously believe American missile defences can prevent China from getting a few ballistically-delivered bombs through to

Los Angeles, San Francisco, Portland, Seattle, Denver, and Chicago. In this type of conflict, target ambiguity is irrelevant when an attack of any kind on the homeland would be grossly escalatory, casting doubts as to whether hypersonic glide weapons are uniquely destabilising in the calculus of nuclear war.

American officials have warned of a Chinese version of **Prompt Global Strike (PGS)** which this sort of orbital manoeuvres could be used for. PGS is an American idea for a long-range non-nuclear missile strike system that may allow any point on Earth to be hit within an hour. This is a capability that American military and weapons experts have discussed for many years as a potentially desirable one. Perhaps those in the United States calling for such weapons capabilities may now appreciate how their own weapons acquisitions wish-lists are perceived by others who may be on the receiving end of them.

For either China or the US, an elaborate PGS-type capability is not likely to provide greater security. Punitive bombardment is not something that can topple determined adversaries and regimes, as the multiple airstrike-dependent interventions of the United States since 1991 have shown. If such a FOBS is to be used for non-nuclear bombardment, many more launchers and bombs will be required, as one bomb is never enough to coerce a target or win a war. The same is true of any conventional long-range hypersonic glide vehicle strike system. Hundreds would be needed and deployed in a short amount of time, further increasing the costs of fielding a credible bombardment system.

Either way, a credible orbital bombardment system, whether for nuclear or conventional strike, would require an enormous logistical effort resulting in the building and fielding of hundreds of launchers, vehicles, warheads, and munitions. Even then, if deployed, it may not prove to be the decisive capability that proponents of PGS think it is.

We must not treat weapons prototypes or flight tests in the same way as we would a massive deployment or rollout of such vehicles or platforms numbering in the hundreds. Many military technologies are designed and tested, but few are rolled out at scale or begin to alter the balance of power. In the same light, the same testing of destructive direct-ascent anti-satellite weapons as China has done since the mid-2000s is one thing, but deploying 250 of them at high levels of readiness is another, and demonstrates more serious resolve, credible threat signalling, and greater damage to arms control efforts.

WHAT'S NEXT? RECOMMENDATIONS:

First, sensationalist alarmism is not a useful, warranted, or justifiable response. The United States and other countries should not rush to react to this with some ill-thought-out weapons technologies in response, repeating the experience of the Soviet FOBS in the 1960s and 1970s. What amounts to lobbing a bomb at a target in a slightly unusual way is not a game-changer when both sides can already vaporise each other. No amount of missile defence arms control will improve the situation of mutually assured destruction either.

Cool heads may not prevail, however. The test of this technology will feed into existing trends of growing fear and mistrust of China in the United States. The Chinese military will also not gain the game-changing capability it is hoping for. In the long run, the Chinese officials that made this decision may come to see it as a mistake if American leaders feel compelled to respond. If China proceeds with testing of a FOBS-like technology, it may be perceived by American officials as an Outer Space Treaty violation waiting to happen. Critics of the Chinese government's perpetually stalled proposals for a Treaty on the Prevention of the Placement of Weapons in Outer Space will also gain more evidence that this diplomatic initiative is disingenuous, further poisoning any genuine efforts at space arms control.

Second, more dialogue on outer space security in the Asia-Pacific is urgently needed.

Sharing basic information and perspectives could be helpful, even in relatively informal and unofficial settings. These kinds of conversations are sorely lacking between the United States and China, and so other governments should not wait for the United States or China to lead on solutions to these space security concerns. States within the Asia-Pacific such as India, Japan, South Korea, Indonesia, Vietnam, and the Philippines can play an important role in promoting or even hosting multilateral dialogues on space security issues that are specific to the region. As greater numbers of small or developing states become more active in the global space economy and seek their own space industries and satellites, there are more opportunities to build more multilateral fora to discuss space security issues and exchange information. Platforms set up for these purposes could provide a lower stakes entry point for US-China information exchanges on space security, and regardless of US-China interaction, there would be benefits to other governments in the region in any case. **The "Quad" effort** – a forum for the US, Japan, India, and Australia - on discussing space security and promoting norms is promising. But this is overdue and only getting started where space security experts have been talking about these issues for decades. However, the Quad may not be a platform that China will wish to interact with any time soon therefore it may not help build a space-centric dialogue.

Third, states can try to strengthen existing international agreements on outer space security that could help maintain or even reduce misunderstanding and misperception around space technology. For example, the **United Nations Convention on Registration of Objects Launched into Outer Space** already exists as an open forum to inform other governments of activities in orbit. However, the Convention does not require signatories to notify the Secretary-General within a specific time frame. One unilateral means of strengthening the mechanism could be for states to voluntarily provide more prompt information, ideally before launch, with the eventual goal of normalising greater openness around space launches. In the long-term, the Convention might be formally amended to require prior notification of space launches. This is a pre-requisite for realising any hope of developing a transparent Space Traffic Management regime and encouraging more routine space situational awareness data between states and private companies.

Any improvement to openness will be helpful in limiting speculation and threat inflation. The British-originated Responsible Behaviours in Outer Space resolution effort at the United Nations General Assembly is a promising avenue of activity here, but it remains to be seen what concrete change in behaviour for the better, if any, will emerge. There is however always a risk such efforts will become trapped in the decades-long deadlock at the **Conference on Disarmament and the Committee on the Prevention of an Arms Race in Outer Space**.

While the technology may not be new, or even a test of a true FOBS, the alarmist politics surrounding this test tell a sobering story regardless. While it is important to monitor technological developments, we should not immediately assume the worst or imagine that it has significantly altered the existing balance of nuclear terror. It is important that practitioners, analysts, journalists and wider society keep talking without losing sight of the limitations of certain technologies and the realities of today's thermonuclear geopolitics.

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ABOUT APLN

The Asia-Pacific Leadership Network for Nuclear Non-Proliferation and Disarmament (APLN) is a network of political, military, and diplomatic leaders from countries across the Asia-Pacific tackling security and defence challenges with a particular focus on addressing and eliminating nuclear weapon risks.

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