### 1NC – T

#### Interpretation: Topical affirmatives must defend an appropriation of outer space

#### Outer space starts 372 miles above the surface of earth.

National Geographic No Date [National Geographic Society, "Atmosphere," <https://www.nationalgeographic.org/encyclopedia/atmosphere/>] Sachin

Earth’s atmosphere stretches from the surface of the planet up to as far as 10,000 kilometers (6,214 miles) above. After that, the atmosphere blends into space. Not all scientists agree where the actual upper boundary of the atmosphere is, but they can agree that the bulk of the atmosphere is located close to Earth’s surface—up to a distance of around eight to 15 kilometers (five to nine miles). While oxygen is necessary for most life on Earth, the majority of Earth’s atmosphere is not oxygen. Earth’s atmosphere is composed of about 78 percent nitrogen, 21 percent oxygen, 0.9 percent argon, and 0.1 percent other gases. Trace amounts of carbon dioxide, methane, water vapor, and neon are some of the other gases that make up the remaining 0.1 percent. The atmosphere is divided into five different layers, based on temperature. The layer closest to Earth’s surface is the troposphere, reaching from about seven and 15 kilometers (five to 10 miles) from the surface. The troposphere is thickest at the equator, and much thinner at the North and South Poles. The majority of the mass of the entire atmosphere is contained in the troposphere—between approximately 75 and 80 percent. Most of the water vapor in the atmosphere, along with dust and ash particles, are found in the troposphere—explaining why most of Earth’s clouds are located in this layer. Temperatures in the troposphere decrease with altitude. The stratosphere is the next layer up from Earth’s surface. It reaches from the top of the troposphere, which is called the tropopause, to an altitude of approximately 50 kilometers (30 miles). Temperatures in the stratosphere increase with altitude. A high concentration of ozone, a molecule composed of three atoms of oxygen, makes up the ozone layer of the stratosphere. This ozone absorbs some of the incoming solar radiation, shielding life on Earth from potentially harmful ultraviolet (UV) light, and is responsible for the temperature increase in altitude. The top of the stratosphere is called the stratopause. Above that is the mesosphere, which reaches as far as about 85 kilometers (53 miles) above Earth’s surface. Temperatures decrease in the mesosphere with altitude. In fact, the coldest temperatures in the atmosphere are near the top of the mesosphere—about -90°C (-130°F). The atmosphere is thin here, but still thick enough so that meteors will burn up as they pass through the mesosphere—creating what we see as “shooting stars.” The upper boundary of the mesosphere is called the mesopause. The thermosphere is located above the mesopause and reaches out to around 600 kilometers (372 miles). Not much is known about the thermosphere except that temperatures increase with altitude. Solar radiation makes the upper regions of the thermosphere very hot, reaching temperatures as high as 2,000°C (3,600°F). The uppermost layer, that blends with what is considered to be outer space, is the exosphere. The pull of Earth’s gravity is so small here that molecules of gas escape into outer space.

#### Large constellations occupy the area below space

**Reno Gazette** 6/11/**21** [Reno Gazette Journal, , "SpaceX satellites soaring across the night sky have many wondering what they are," https://www.rgj.com/story/news/2021/06/11/spacex-starlink-satellites-night-sky-lights/7643864002/, accessed 1-23-2022 azhang]

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If you have looked up at the night sky lately, you may have seen a string of lights blazing by.

While these may be an unidentified object to a lot of people, they are part of Elon Musk’s goal of universal internet.

These SpaceX satellites, known as Starlinks, are often as bright as an airplane and travel in packs of up to 60 satellites. They orbit the earth at one of the lowest elevations allowed for spacecraft, around 186 miles above earth's surface and up to almost 342 miles high.

Currently, there are about 1,800 Starlink satellites in orbit. SpaceX has applied to place upwards of 30,000 satellites in orbit to provide high-speed wireless internet.

For scale, currently there are about 4,300 active satellites orbiting the planet and historically, only 11,670 ever placed into orbit since the launch of the first satellite, Sputnik, in 1957. According to SpaceNews.com, SpaceX [began placing Starlink satellites in orbit](https://spacenews.com/spacex-launches-60-starlink-satellites-begins-constellation-buildout/) in May of 2019.

When we reached out to SpaceX for more information they said no one was available for an interview.

'100,000 functional satellites in orbit around the earth'

“Starlink is just one representative of a whole new class of what are being called satellite mega-constellations,” said Dr. John Barentine, the director of conservation of the [International Dark-Sky Association](https://www.darksky.org/). These mega-constellations are a group of satellites that fly together in some sort of formation.

#### The Kármán line is arbitrary – no legal international definition

Hignett 21 Katherine Hignett 19 July 2021. “Where does space begin as Jeff Bezos and Richard Branson argue over the Kármán line?” [Where does space begin? Bezos and Branson argue over the Kármán line | Metro News](https://metro.co.uk/2021/07/19/where-does-space-begin-bezos-and-branson-argue-over-the-karman-line-14938534/#:~:text=In%20reality%2C%20however%2C%20the%20100km%20K%C3%A1rm%C3%A1n%20line%20is,himself%20suggested%20the%20line%20should%20sit%20at%2084km.) Accessed 1-23 // gord0

Where does space start – what is the Kármán line?

Blue Origin claims that the so-called ‘Kármán line’ — 100km above Earth — is the ‘internationally recognized’ start of space.

The Virgin Galactic craft reached approximately 86km, some 14km short of this boundary [on Sunday](https://metro.co.uk/2021/07/11/sir-richard-branson-successfully-flies-to-space-with-virgin-galactic-14887410/).

Named after engineer and physicist Theodore von Kármán, the 100km line was established in the 1960s by an organisation called the Fédération Aéronautique Internationale.

Kármán wanted to define the point where aeronautics became astronautics.

Earth’s atmosphere becomes progressively thinner the higher an altitude you reach.

Air helps carry a plane as it flies through the air in a phenomenon known as ‘aerodynamic lift.’

The thinner the air becomes, the faster a craft must travel to generate enough lift to stay in the sky.

Kármán thought that at a certain point, the air would become so thin that it would stop contributing to lift. This, he suggested, would occur at the physical boundary of space.

He thought defining this point could help governments decide on airspace boundaries.

He wrote in his autobiography: ‘Below this line, space belongs to each country. Above this level there would be free space.’

In reality, however, the 100km Kármán line is arbitrary, and no legal international definition of the boundary of space exists.

In fact, Kármán himself suggested the line should sit at 84km.

In recent years, astronomers such as Harvard University’s Jonathan McDowell have argued in favour of this lower limit, citing the fact that objects can stay in orbit without disintegrating even if they drop to altitudes of around 80km to 90km.

#### Violation: 342 miles is less than the 372 miles necessary to be considered outer space; they explicitly defend only LEO

#### Vote neg:

#### 1] Limits and ground: the aff interpretation explodes the topic to allow any aff about space generally which structurally alters the neg research burden because there’s a qualitative difference between outer space and the atmosohere. Kills core neg generics like space col bad and mining that don’t link if you specify a part of space

#### 2] Precision – Justifies the aff arbitrarily doing away with words in the resolution - Even if its not drop the debater, this implicates solvency independently.

#### Use competing interps - Topicality is a binary question, you can’t be reasonably topical and it invites a race to the bottom of intervention

#### Drop the debater – dropping the argument doesn’t rectify abuse since winning T proves why we don’t have the burden of rejoinder against their aff.

#### No RVIS – it’s your burden to be topical

### 1NC – DA

#### Xi’s regime is stable now, but its success depends on strong growth and private sector development.

**Mitter and Johnson 21** [Rana Mitter and Elsbeth Johnson, [Rana Mitter](https://hbr.org/search?term=rana%20mitter&search_type=search-all) is a professor of the history and politics of modern China at Oxford. [Elsbeth Johnson](https://hbr.org/search?term=elsbeth%20johnson&search_type=search-all), formerly the strategy director for Prudential PLC’s Asian business, is a senior lecturer at MIT’s Sloan School of Management and the founder of SystemShift, a consulting firm. May-June 2021, "What the West Gets Wrong About China," Harvard Business Review, [https://hbr.org/2021/05/what-the-west-gets-wrong-about-china accessed 12/14/21](https://hbr.org/2021/05/what-the-west-gets-wrong-about-china%20accessed%2012/14/21)] Adam

In China, however, growth has come in the context of stable communist rule, suggesting that democracy and growth are not inevitably mutually dependent. In fact, many Chinese believe that the country’s recent economic achievements—large-scale poverty reduction, huge infrastructure investment, and development as a world-class tech innovator—have come about because of, not despite, China’s authoritarian form of government. Its aggressive handling of Covid-19—in sharp contrast to that of many Western countries with higher death rates and later, less-stringent lockdowns—has, if anything, reinforced that view.

China has also defied predictions that its authoritarianism would inhibit its capacity to [innovate](https://hbr.org/2011/06/what-the-west-doesnt-get-about-china). It is a global leader in AI, biotech, and space exploration. Some of its technological successes have been driven by market forces: People wanted to buy goods or communicate more easily, and the likes of Alibaba and Tencent have helped them do just that. But much of the technological progress has come from a highly innovative and well-funded military that has invested heavily in China’s burgeoning new industries. This, of course, mirrors the role of U.S. defense and intelligence spending in the development of Silicon Valley. But in China the consumer applications have come faster, making more obvious the link between government investment and products and services that benefit individuals. That’s why ordinary Chinese people see Chinese companies such as Alibaba, Huawei, and TikTok as sources of national pride—international vanguards of Chinese success—rather than simply sources of jobs or GDP, as they might be viewed in the West.

Thus July 2020 polling data from the Ash Center at Harvard’s Kennedy School of Government revealed 95% satisfaction with the Beijing government among Chinese citizens. Our own experiences on the ground in China confirm this. Most ordinary people we meet don’t feel that the authoritarian state is solely oppressive, although it can be that; for them it also provides opportunity. A cleaner in Chongqing now owns several apartments because the CCP reformed property laws. A Shanghai journalist is paid by her state-controlled magazine to fly around the world for stories on global lifestyle trends. A young student in Nanjing can study propulsion physics at Beijing’s Tsinghua University thanks to social mobility and the party’s significant investment in scientific research.

#### Megaconstellations are part of China’s core space agenda, is seen as their greatest opportunity to compete with the West, and is a national priority – the private sector is key and the plan is a 180

**Jones, 21** (Ash Jones, 4-27-2021, accessed on 1-23-2022, Industry Europe, "China's plans for a 13,000 satellite megaconstellation", https://industryeurope.com/sectors/aerospace-defence/china-s-plans-for-a-13-000-satellite-megaconstellation/)azhang

by Ash Jones 27 April 2021 14:00 China has announced plans to oversee and construct a megaconstellation - used for sending satellite internet services - made up of a little under 13,000 satellites through a coordinated effort involving many of the country's key space players. Satellites are used to project networks across the globe; pictured is an artists' rendition of a global satellite internet network. Credit: ESA Plans for this have been publicly known since at least October 2020, when analysts predicted the Chinese state would move to create a Low Earth Orbit (LEO) constellation to compete with major western rivals such as Amazon, OneWeb and SpaceX. Read more: NASA & California partner on methane-mapping satellite project Recent comments by Chinese state officials suggest it may already make use of existing satellite infrastructure, potentially forming part of the larger "Guoweng" network, part of its idea for a national internet network. These have come as a boost to previous plans for similar networks made last year. SpaceNews reported on April 21 that spectrum filings were submitted to the International Telecommunication Union (ITU) by China in September last year. The filings show as many as 12,992 satellites will make up the constellation, although there are fears this would only serve China's interest by operating state-run media and intranet outlets. These would lie - as the name LEO suggests - in low orbit, anywhere between 500 and 1500 km and would operate under a number of frequency bands. In a March 7 interview with Shanghai Securities News, Bao Weimin, a senior official with the state-owned China Aerospace Science and Technology Bao Weimin. Credit: SASAC Corp. (CASC) revealed it had already launched some test satellites. “We are planning and developing space Internet satellites and have launched test satellites," he said. "A 'State Grid' company will also be established to be responsible for the overall planning and operation of space Internet construction." Washington DC-based analyst Bhavya Lal surmised that out of the 20 or so Chinese companies engaged in satellite technologies, fewer than a dozen had proposed the use of constellation at the time the filings were submitted. “Many focus on narrowband communications, targeting markets such as the Internet of Things (IoT)," he said in a statement released in October 2020, adding that many of the state-owned outlets "[had] the deeper pockets needed to rapidly launch satellite constellations." She concluded that many of the private companies lacked the required hardware to launch. Read more: The satellite drone that can beam 5G from the stratosphere She said: “However, as in other areas, the Chinese are making fast progress. The best we can tell the current focus of most companies is domestic. But as the Chinese have done in other areas such as high-speed rail, it would be not a stretch of the imagination that once the bugs in the system are worked out domestically, the Chinese will begin to market services internationally.” It is currently unknown if any of this has changed in the six months since it broke. In mid-April Ge Yujung, the president of China Spacesat, another key player, revealed the previously planned satellite clusters would be altered to fit a new plan, saying the Hongyan and Hongyun systems would "undergo major changes" by "relevant government authorities." He also revealed plans for the constellations have been in development since at least 2018 and that CASC was planning to launch at least 60 satellites by 2022. It is currently unclear how the project will proceed, but news reports indicate it has become a national priority. SpaceX's global satellite network was completed in early April, and the network is now active. It is likely China has issued this as a national priority in order to compete with western rivals.

#### Shifts in regime perception threatens CCP’s legitimacy from nationalist hardliners

Weiss 19 Jessica Weiss 1-29-2019 “Authoritarian Audiences, Rhetoric, and Propaganda in International Crises: Evidence from China” <http://www.jessicachenweiss.com/uploads/3/0/6/3/30636001/19-01-24-elite-statements-isq-ca.pdf> (Associate Professor of Government at Cornell University)//Elmer

Public support—or the appearance of it—matters to many autocracies. As Ithiel de Sola Pool writes, modern dictatorships are “highly conscious of public opinion and make major efforts to affect it.”6 Mao Zedong told his comrades: “When you make revolution, you must first manage public opinion.”7 Because autocracies often rely on **nationalist mythmaking**,8 success or failure in defending the national honor in international crises could burnish the leadership’s patriotic credentials or spark opposition. **Shared outrage at the regime’s foreign policy failures could galvanize street protests or elite fissures, creating intraparty upheaval** or inviting military officers to step in to restore order. Fearing a domestic backlash, authoritarian leaders may feel compelled to take a tough international stance. Although authoritarian leaders are rarely held accountable to public opinion through free and fair elections, fears of popular unrest and irregular ouster often weigh heavily on autocrats seeking to maximize their tenure in office. Considering the harsh consequences that authoritarian elites face if pushed out of office, even a small increase in the probability of ouster could alter authoritarian incentives in international crises.9 A history of nationalist uprisings make Chinese citizens and leaders especially aware of the linkage between international disputes and domestic unrest. The weakness of the PRC’s predecessor in defending Chinese sovereignty at the Paris Peace Conference in 1919 galvanized protests and a general strike, forcing the government to sack three officials and reject the Treaty of Versailles, which awarded territories in China to Japan. These precedents have made Chinese officials particularly sensitive to the appearance of hewing to public opinion. As the People’s Daily chief editor wrote: “History and reality have shown us that public opinion and regime safety are inseparable.”10 One Chinese scholar even claimed: “the Chinese government probably knows the public’s opinion better and reacts to it more directly than even the U.S. government.”11

#### Xi will launch diversionary war to domestic backlash – escalates in multiple hotspots

Norris 17, William J. Geostrategic Implications of China’s Twin Economic Challenges. CFR Discussion Paper, 2017. (Associate professor of Chinese foreign and security policy at Texas A&M University’s Bush School of Government and Public Service)//Elmer

Populist pressures might tempt the **party leadership** to encourage **diversionary nationalism**. The logic of this concern is straightforward: the Communist Party might seek to **distract a restless domestic population** with **adventurism abroad**.19 The **Xi** administration wants to **appear tough** in its **defense of foreign encroachments** against China’s interests. This need stems from a long-running narrative about how a weak Qing dynasty was unable to defend China in the face of European imperial expansion, epitomized by the Opium Wars and the subsequent treaties imposed on China in the nineteenth century. The party is **particularly sensitive** to **perceptions of weakness** because much of its **claim to legitimacy**—manifested in **Xi’s Chinese Dream** campaign today—stems from the party’s claims of leading the **restoration of Chinese greatness**. For example, the May Fourth Movement, a popular protest in 1919 that helped catalyze the CPC, called into question the legitimacy of the Republic of China government running the country at that time because the regime was seen as not having effectively defended China’s territorial and sovereignty interests at the Versailles Peace Conference. **Diversionary nationalist frictions** would likely occur if the Chinese leadership portrayed a foreign adversary as having made the first move, thus forcing Xi to stand up for China’s interests. An example is the 2012 attempt by the nationalist governor of Tokyo, Shintaro Ishihara, to buy the Senkaku/Diaoyu Islands from a private owner.20 Although the Japanese central government sought to avert a crisis by stepping in to purchase the islands—having them bought and administered by Ishihara’s Tokyo metropolitan government would have dragged Japan into a confrontation with China—China saw this move as part of a deliberate orchestration by Japan to nationalize the islands. Xi seemingly had no choice but to defend China’s claims against an attempt by Japan to consolidate its position on the dispute.21 This issue touched off a period of heated tensions between China and Japan, lasting more than two years.22 Such dynamics are not limited to Japan. Other possible areas of conflict include, but are not necessarily limited to, **Taiwan**, **India**, and the **South China Sea** (especially with the **Philippines** and **Vietnam**). The Chinese government will use such tactics if it believes that the costs are relatively low. Ideally, China would like to appear tough while avoiding material repercussions or a serious diplomatic breakdown. Standing up against foreign encroachment—without facing much blowback—could provide Xi’s administration with a tempting source of noneconomic legitimacy. However, over the next few years, Xi will probably not be actively looking to get embroiled abroad. Cushioning the fallout from slower growth while managing a structural economic transition will be difficult enough. Courting potential international crises that distract the central leadership would make this task even more daunting. Even if the top leadership did not wish to provoke conflict, a smaller budgetary allotment for security could cause **military interests** in China to **deliberately instigate trouble** to **justify** their **claims over increasingly scarce resources**. For example, an air force interested in ensuring its funding for a midair tanker program might find the existence of far-flung territorial disputes to be useful in making its case. Such a case would be made even stronger by a pattern of recent frictions that highlights the necessity of greater air power projection. Budgetary pressures may be partly behind a recent People’s Liberation Army reorganization and headcount reduction. A slowing economy might cause a further deceleration in China’s military spending, thus increasing such pressures as budgetary belts tighten. Challenges to Xi’s Leadership Xi Jinping’s efforts to address economic challenges could fail, unleashing consequences that extend well beyond China’s economic health. For example, an **economic collapse** could give rise to a Vladimir **Putin–like redemption figure** in China. Xi’s approach of centralizing authority over a diverse, complex, and massive social, political, and economic system is a **recipe for brittleness**. Rather than designing a resilient, decentralized governance structure that can gracefully cope with localized failures at particular nodes in a network, a highly centralized architecture **risks catastrophic**, **system-level failure**. Although centralized authority offers the tantalizing chimera of stronger control from the center, it also puts all the responsibility squarely on Xi’s shoulders. With China’s ascension to great power status, the consequences of internecine domestic political battles are increasingly playing out on the world stage. The international significance of China’s domestic politics is a new paradigm for the Chinese leadership, and one can expect an adjustment period during which the outcome of what had previously been relatively insulated domestic political frictions will likely generate **unintended international repercussions**. Such dynamics will influence Chinese foreign policy and security behavior. Domestic arguments over ideology, bureaucratic power struggles, and strategic direction could all have **ripple effects abroad**. Many of China’s party heavyweights still employ a narrow and exclusively domestic political calculus. Such behavior increases the possibility of international implications that are not fully anticipated, **raising the risks** of **strategic miscalculation** on the world stage. For example, the factional power struggles that animated the Cultural Revolution were largely driven by domestic concerns, yet manifested themselves in Chinese foreign policy for more than a decade. During this period, China was not the world’s second largest economy and, for much of this time, did not even have formal representation at the United Nations. If today’s globally interconnected China became engulfed in similar domestic chaos, the effects would be felt worldwide.23 Weakened Fetters of Economic Interdependence If China successfully transitioned away from its export-driven growth model toward a consumption-driven economic engine over the next four or five years, it could no longer feel as constrained by economic interdependence. To the extent that such constraints are loosened, the U.S.-China relationship will be more prone to conflict and friction.24 While China has never been the archetypal liberal economic power bent on benign integration with the global economy, its export-driven growth model produced a strong strategic preference for stability. Although past behavior is not necessarily indicative of future strategic calculus, China’s “economic circuit breaker” logic seems to have held its most aggressive nationalism below the threshold of war since 1979. A China that is both comparatively strong and less dependent on the global economy would be a novel development in modern geopolitics. As China changes the composition of its international economic linkages, global integration could place fewer constraints on it. Whereas China has been highly reliant on the import of raw materials and semifinished goods for reexport, a consumption-driven China could have a different international trade profile. China could still rely on imported goods, but their centrality to the country’s overall economic growth would be altered. Imports of luxury goods, consumer products, international brands, and services may not exert a significant constraining influence, since loss of access to such items may not be seen as strategically vital. If these flows were interrupted or jeopardized, the result would be more akin to an inconvenience than a strategic setback for China’s rise. That said, China is likely to continue to highly depend on imported oil even if the economic end to which that energy resource is directed shifts away from industrial and export production toward domestic consumption.

#### US–China war goes nuclear – crisis mis-management ensures conventional escalation - extinction

Kulacki 20 [Dr. Gregory Kulacki focuses on cross-cultural communication between the United States and China on nuclear and space arms control and is the China Project Manager for the Global Security Program at the Union of Concerned Scientists, 2020. Would China Use Nuclear Weapons First In A War With The United States?, Thediplomat.com, https://thediplomat.com/2020/04/would-china-use-nuclear-weapons-first-in-a-war-with-the-united-states/] srey

Admiral Charles A. Richard, the head of the U.S. Strategic Command, recently told the Senate Armed Service Committee he “could drive a truck” through the holes in China’s no first use policy. But when Senator John Hawley (R-MO) asked him why he said that, Commander Richard backtracked, described China’s policy as “very opaque” and said his assessment was based on “very little” information. That’s surprising. **China** has been exceptionally **clear** **about** its **intentions** **on** the possible **first** **use** **of** **nuclear** **weapons**. On the day of its first nuclear test on October 16, 1964, China declared it “will never at any time or under any circumstances be the first to use nuclear weapons.” That **unambiguous** **statement** **has** **been** a **cornerstone** **of** **Chinese** **nuclear** **weapons** policy for 56 years and has been repeated frequently in authoritative Chinese publications for domestic and international audiences, including a highly classified training manual for the operators of China’s nuclear forces. Richard should know about those publications, particularly the training manual. A U.S. Department of Defense translation has been circulating within the U.S. nuclear weapons policy community for more than a decade. The commander’s comments to the committee indicate a familiarity with the most controversial section of the manual, which, in the eyes of some U.S. analysts, indicates there may be some circumstances where **China** **would** **use** **nuclear** **weapons** **first** **in** a **war** **with** **the** **U**nited **S**tates. This U.S. misperception is understandable, especially given the difficulties the Defense Department encountered translating the text into English. The language, carefully considered in the context of the entire book, articulates a strong reaffirmation of China’s no first use policy. But it also reveals **Chinese** military planners are **struggling** **with** **crisis** **management** **and** **considering** **steps** **that** could **create** **ambiguity** **with** **disastrous** **consequences**. Towards the end of the 405-page text on the operations of China’s strategic rocket forces, in a chapter entitled, “Second Artillery Deterrence Operations,” the authors explain what China’s nuclear forces train to do if **“**a strong military power possessing nuclear‐armed missiles and an absolute advantage in high‐tech conventional weapons is carrying out intense and continuous attacks against our major strategic targets and we have no good military strategy to resist the enemy.**”** The military power they’re talking about is the United States. The authors indicate China’s nuclear missile forces train to take specific steps, including increasing readiness and conducting launch exercises, to “dissuade the continuation of the strong enemy’s conventional attacks.” The manual refers to these steps as an “adjustment” to China’s nuclear policy and a “lowering” of China’s threshold for brandishing its nuclear forces. Chinese leaders would only take these steps in extreme circumstances. The text highlights several triggers such as U.S. conventional bombing of China’s nuclear and hydroelectric power plants, heavy conventional bombing of large cities like Beijing and Shanghai, or other acts of **conventional** **warfare** **that** “**seriously** **threatened**” the “safety and **survival**” of the nation. U.S. Misunderstanding Richard seems to believe this planned adjustment in China’s nuclear posture means China is **preparing** **to** **use** **nuclear** **weapons** first under these circumstances. He told Hawley that there are a “number of situations where they may conclude that first use has occurred that do not meet our definition of first use.” The head of the U.S. Strategic Command appears to assume, as do other U.S. analysts, that the **Chinese** would **interpret** **these** types of U.S. conventional **attacks** **as** **equivalent** **to** a **U.S. first use** **of** **nuclear** **weapons** against China. But that’s not what the text says. “Lowering the threshold” refers to China putting its nuclear weapons on alert — it does not indicate Chinese leaders might lower their threshold for deciding to use nuclear weapons in a crisis. Nor does the text indicate Chinese nuclear forces are training to launch nuclear weapons first in a war with the United States. China, unlike the United States, keeps its nuclear forces off-alert. Its warheads are not mated to its missiles. China’s nuclear-armed submarines are not continuously at sea on armed patrols. The manual describes how China’s nuclear warheads and the missiles that deliver them are controlled by two separate chains of command. Chinese missileers train to bring them together and launch them after China has been attacked with nuclear weapons. All of these behaviors are consistent with a no first use policy. The “adjustment” Chinese nuclear forces are preparing to make if the United States is bombing China with impunity is to place China’s nuclear forces in a state of readiness similar to the state the nuclear forces of the United States are in all the time. This step is intended not only to end the bombing, but also to convince U.S. decision-makers they cannot expect to destroy China’s nuclear retaliatory capability if the crisis escalates. Chinese Miscalculation Unfortunately, alerting Chinese nuclear forces at such a moment could have terrifying consequences. Given the relatively small size of China’s nuclear force, a U.S. president might be tempted to try to limit the possible damage from a Chinese nuclear attack by destroying as many of China’s nuclear weapons as possible before they’re launched, especially if the head of the U.S. Strategic Command told the president China was preparing to strike first. One study concluded that if the United States used nuclear weapons to attempt to knock out a small fraction of the Chinese ICBMs that could reach the United States it may kill tens of millions of Chinese civilians. The authors of the text assume alerting China’s nuclear forces would “create a great shock in the enemy’s psyche.” That’s a fair assumption. But they also assume this shock could “dissuade the continuation of the strong enemy’s conventional attacks against our major strategic targets.” That’s highly questionable. There is a **substantial** **risk** **the** **U**nited **S**tates **would** **respond** **to** this implicit **Chinese** **threat** **to** **use** **nuclear** **weapons** **by** **escalating**, rather than halting, its **conventional** **attacks**. If China’s nuclear forces were targeted, it would put even greater strain on the operators of China’s nuclear forces. A **slippery** **slope** **to** **nuclear** **war** Chinese military planners are aware that attempting to coerce the United States into halting conventional bombardment by alerting their nuclear forces could fail. They also know it might trigger a nuclear war. But if it does, they are equally clear China won’t be the one to start it. Nuclear attack is often preceded by nuclear coercion. Because of this, in the midst of the process of a high, strong degree of nuclear coercion we should prepare well for a nuclear retaliatory attack. The more complete the preparation, the higher the credibility of nuclear coercion, the easier it is to accomplish the objective of nuclear coercion, and the lower the possibility that the nuclear missile forces will be used in actual fighting. They assume if China demonstrates it is well prepared to retaliate the United States would not risk a damage limitation strike using nuclear weapons. And even if the United States were to attack China’s nuclear forces with conventional weapons, China still would not strike first. In the opening section of the next chapter on “nuclear retaliatory attack operations” the manual instructs, as it does on numerous occasions throughout the entire text: According to our country’s principle, its stand of no first use of nuclear weapons, the Second Artillery will carry out a nuclear missile attack against the enemy’s important strategic targets, according to the combat orders of the Supreme Command, only after the enemy has carried out a nuclear attack against our country. Richard is wrong. There are no holes in China’s no first use policy. But the worse-case planning articulated in this highly classified military text is a significant and deeply troubling departure from China’s traditional thinking about the role of nuclear weapons. Mao Zedong famously called nuclear weapons “a paper tiger.” Many assumed he was being cavalier about the consequences of nuclear war. But what he meant is that they would not be used to fight and win wars. U.S. nuclear threats during the Korean War and the Taiwan Strait Crisis in the 1950s – threats not followed by an actual nuclear attack – validated Mao’s intuition that nuclear weapons were primarily psychological weapons. Chinese leaders decided to acquire nuclear weapons to free their minds from what Mao’s generation called “**nuclear** **blackmail**.” A former director of China’s nuclear weapons laboratories told me China developed them so its leaders could “sit up with a straight spine.” Countering nuclear blackmail – along with compelling other nuclear weapons states to negotiate their elimination – were the only two purposes Chinese nuclear weapons were meant to serve. Contemporary Chinese military planners appear to have added a new purpose: compelling the United States to halt a conventional attack. Even though it only applies in extreme circumstances, it **increases** the **risk** **that** a **war** between the United States and China **will** **end** **in** a nuclear exchange with unpredictable and **catastrophic** **consequences**. Adding this new purpose could also be the first step on a slippery slope to an incremental broadening the role of nuclear weapons in Chinese national security policy. Americans would be a lot safer if we could avoid that. The United States government should applaud China’s no first use policy instead of repeatedly calling it into question. And it would be wise to adopt the same policy for the United States. If both countries declared they would never use nuclear weapons first it may not guarantee they can avoid a nuclear exchange during a military crisis, but it would make one far less likely.

## Case

### Collisions

#### non UQ – squo debris thumps

Orwig 16 [(Jessica, MS in science and tech journalism from Texas A&M, BS in astronomy and physics from Ohio State) “Russia says a growing problem in space could be enough to spark a war,” Insider,’ January 26, 2016, <https://www.businessinsider.com/russia-says-space-junk-could-spark-war-2016-1>] TDI

NASA has already [warned that](https://www.businessinsider.com/space-junk-at-critical-density-2015-9) the large amount of space junk around our planet is growing beyond our control, but now a team of Russian scientists has cited another potentially unforeseen consequence of that debris: War.

Scientists estimate that anywhere from 500,000 to 600,000 pieces of human-made space debris between 0.4 and 4 inches in size are currently orbiting the Earth and traveling at speeds over [17,000 miles per hour](https://www.nasa.gov/mission_pages/station/news/orbital_debris.html).

If one of those pieces smashed into a military satellite it "may provoke political or even armed conflict between space-faring nations," Vitaly Adushkin, a researcher for the Institute of Geosphere Dynamics at the Russian Academy of Sciences, reported in a paper set to be published in the peer-reviewed journal [Acta Astronautica](https://www.sciencedirect.com/science/article/pii/S0094576515303416), which is sponsored by the International Academy of Astronautics.

#### Alliances check miscalc – too costly.

MacDonald 13 [(Bruce, teaches at the United States Institute of Peace on strategic posture and space/cyber security issues, leads a study on China and Crisis Stability in Space, and is adjunct professor at the Johns Hopkins School of Advanced International Studies) “Deterrence and Crisis Stability in Space and Cyberspace,” in Anti-satellite Weapons, Deterrence and Sino-American Space Relations, September 2013, <https://apps.dtic.mil/dtic/tr/fulltext/u2/a587431.pdf>] TDI

The US alliance structure can promote deterrence and crisis stability in space, as with nuclear deterrence. China has no such alliance system. If China were to engage in large-scale offensive counter-space operations, it would face not only the United States, but also NATO, Japan, South Korea and other highly aggrieved parties. Given Beijing’s major export dependence on these markets, and its dependence upon them for key raw material and high technology imports, China would be as devastated economically if it initiated strategic attacks in space. In contrast to America’s nuclear umbrella and extended deterrence, US allies make a tangible and concrete contribution to extended space deterrence through their multilateral participation in and dependence upon space assets. Attacks on these space assets would directly damage allied interests as well as those of the United States, further strengthening deterrent effects.

#### No escalation - If we don’t have sufficient data we move the satellite to ‘lost’ category

Hoots ’15 [Felix; Fall 2015; Distinguished Engineer in the System Analysis and Simulation Subdivision, Ph.D. in Mathematics from Auburn University, M.S. in Mathematics from Tennessee Tech University; Crosslink, “Keeping Track: Space Surveillance for Operational Support,” <https://aerospace.org/sites/default/files/2019-04/Crosslink%20Fall%202015%20V16N1%20.pdf>; RP]

The JSpOC tasks these sensors to track specific satellites and to record data such as time, azimuth, elevation, and range. This data is used to create orbital element sets or state vectors that represent the observed position of the satellite. The observed position can then be compared with the predicted position. The dynamic models used for predicting satellite motion are not perfect; factors such as atmospheric density variation caused by unmodeled solar activity can cause the predicted position to gradually stray from the true position. The observations are used to correct the predicted trajectory so the network can continue to track the satellite. This process of using observations to correct and refine an orbit in an ongoing feedback loop is called catalog maintenance, and it continues as long as the satellite remains in orbit. Ideally, the process is automatic, with manual intervention only required when satellites maneuver or get near to reentry due to atmospheric drag.

Sometimes, however, more effort is required. For example, a sensor may encounter a satellite trajectory that does not correspond well to anything in the catalog. Such observations are known as partially correlated observations if they are somewhat close to a known orbit or uncorrelated observations (or uncorrelated tracks) if they are far from any known orbit. Also, if a satellite is not tracked for five days, it is placed on an attention list for manual intervention. In that case, an analyst will attempt to match the wayward satellite to one of these partially correlated or uncorrelated tracks. If that effort succeeds, then the element sets are updated, and the object is returned to automatic catalog maintenance. On the other hand, if the satellite cannot be matched to a partially correlated or uncorrelated track, the satellite information continues to age. If it reaches 30 days without a match, the satellite is placed on the lost list.

One of the most visible uses of the catalog is to warn about collision risks for active payloads. This function predicts potential close approaches three to five days in advance to allow time to plan avoidance maneuvers, if necessary. Unplanned maneuvers may disturb normal operations and deplete resources for future maneuvers, so one would like to have high confidence in the collision-risk predictions. The reliability of the predictions depends directly on the accuracy of the orbit calculation, which in turn depends on the quality and quantity of the tracking data, which is limited by the capability of the Space Surveillance Network. Simply put, there are not enough tracking resources in the network to achieve high-quality orbits for every object in the catalog. Furthermore, many smaller objects can only be tracked by the most sensitive radars, and this tracking is infrequent. Most objects in the catalog are considered debris, which can neither maneuver nor broadcast telemetry. On the other hand, some satellite operators depend exclusively on the satellite catalog to know where their satellites are, and users of the satellite orbital data depend on the catalog to know when the satellites will be within view.

This situation creates a challenging problem in balancing Space Surveillance Network resources to support the collision-warning task (tracking as many potential hazards as possible) while also providing highly accurate support to operational satellites (tracking the spacecraft as precisely as possible). The practical solution is to perform collision risk assessment using a large screening radius to ensure no close approaches are missed despite lower-quality predictions. Once an object is identified as having a potentially close approach, then the tasking level is raised, with the expectation that more tracking data will be obtained to refine the collision risk calculations. When the danger has passed, the object reverts to a normal tracking level.

Collisions and spontaneous breakups do happen. The first satellite breakup occurred on June 29, 1961, when residual fuel in an Ablestar rocket body exploded, creating 296 trackable pieces of debris. Since that time, there have been more than 200 satellite breakups, the most notable being the missile intercept of the Fengyun-1C satellite, which created more than 3300 trackable fragments. In most cases, these breakups are first detected by the phased-array radars in the Space Surveillance Network. When multiple objects are observed where only one was expected, the downstream sensors are alerted, but no tasking is issued because specific debris orbits are not yet established. Tracks are taken and tagged as uncorrelated. Analysts at JSpOC then attempt to link uncorrelated tracks from different sensors to form a candidate orbit. Subsequent tracking improves the orbit to the point that the object can be named and numbered and moved into the catalog for automatic maintenance.

#### hacking inevitable public sector thumps.

#### Even a worst-case cyber-attack wouldn’t prompt nuclear retaliation -- prefer official military clarification

Tucker, 18 -- Patrick Tucker; technology editor for Defense One, citing Gen. Paul Selva, vice chairman of the Joints Chiefs of Staff. (2-2-2018; "No, the US Won’t Respond to A Cyber Attack with Nukes;" Defense One; https://www.defenseone.com/technology/2018/02/no-us-wont-respond-cyber-attack-nukes/145700/; //GrRv)

The idea that the U.S. is building new low-yield nuclear weapons to respond to a cyber attack is “not true,” military leaders told reporters in the runup to the Friday release of the new Nuclear Posture Review.

“The people who say we lowered the threshold for the use of nuclear weapons are saying, ‘but we want these low-yield nuclear weapons so that we can answer a cyber attack because we’re so bad at cyber security.’ That’s just fundamentally not true,” Gen. Paul Selva, vice chairman of the Joints Chiefs of Staff, said Tuesday at a meeting with reporters.

It’s an idea that military leaders have been pushing back against since the New York Times ran a Jan. 16 story headlined, “Pentagon Suggests Countering Devastating Cyberattacks With Nuclear Arms.”

When would the U.S. launch a nuclear attack in response to a non-nuclear event? The Defense Department says the threshold hasn’t changed since the Obama administration’s own nuclear posture review in 2010, but a draft of the new review that leaked online caused a bit of drama in its attempts to dispel “ambiguity.”

The new review gives examples of “non-nuclear strategic attacks,” Robert Soofer, deputy assistant secretary for nuclear and missile defense policy, told reporters on Thursday. “It could be catastrophic attacks against civilian populations, against infrastructure. It could be an attack using a non-nuclear weapon against our nuclear command-and-control [or] early-warning satellites. But we don’t talk about cyber.”

In his own conversation with reporters, Selva broadened “early warning” systems to include ones that provide “indications of warning that are important to our detection of an attack.” He also emphasized, “We never said ‘cyber.’”

There’s a reason for that. While cyber attacks on physical infrastructure can be very dangerous, they are unlikely to kill enough people to provoke a U.S. nuclear response.

An National Academies of Science and Engineering analysis of the vulnerability of U.S. infrastructure makes that point. A major cyber attack could cut off electrical power, resulting in “people dying from heat or cold exposure, etc.,” said Granger Morgan, co-director of the Carnegie Mellon Electricity Industry Center and one of the chairs of the report. “A large outage of long duration could cover many states and last for weeks or longer. Whether and how many casualties there could be would depend on things like what the weather was during the outage.”

It’s a huge problem but not an event resulting in tens of thousands of immediate deaths.

Contrast that with a nuclear attack on a city like Moscow, even one using a device of 6 kilotons, much smaller than the ones the United States used against Japanese targets in World War II. The immediate result: there would be 40,000 deaths, according to the online nuclear simulation tool NukeMap.

Russia has demonstrated a willingness to take down power services with cyber attacks, as they did in Ukraine on Christmas Eve 2015. But these attacks were brief and occured in the context of actual fighting.

In other words, the worst cyber physical attack that top experts believe credible likely does not meet the threshold that the Defense Department has set out for deploying a nuclear weapon.

### Astronomy

#### Chance of asteroids is tiny and no extinction

Robert **Walker 16**. Software Developer of Tune Smithy, Wolfson College, Oxford. 12-14-2016. "Why Resilient Humans Would Survive Giant Asteroid Impact." Science 2.0. https://www.science20.com/robert\_inventor/we\_wont\_go\_extinct\_after\_a\_major\_asteroid\_impact\_even\_96\_of\_species\_extinct\_0\_chance\_of\_humans\_extinct-187383

This is something you hear said so often - that we risk being hit by an asteroid that could make humans extinct. But do we really? This is the article I’m commenting on, a recently breaking news story: Earth woefully unprepared for surprise comet or asteroid, Nasa scientist warns. Some are already worrying that it means that we are all due to die in the near future from an asteroid impact. Well, no, it doesn't mean that. So, what is the truth behind it? The source of all this is a comment by Dr Joseph Nuth who warns: “But on the other hand they are the extinction-level events, things like dinosaur killers, they’re 50 to 60 million years apart, essentially. You could say, of course, we’re due, but it’s a random course at that point.” Photograph of comet Siding Spring by Hubble - right hand image is more processed. This comet did a close flyby of Mars and at one point was predicted to have a tiny chance of hitting Mars. In the end it missed Mars by more than a quarter of the distance from Earth to the Moon If you read the rest of the article, it’s a worthy goal, to prepare us for asteroid impacts of all sizes from the small Chelyabinsk one up to really large 10 km ones. There are a number of things potentially confusing about this statement however, if you read it as a non scientist. Although there is a risk of “mass extinction” if a large asteroid hit Earth, “mass extinction” there doesn’t mean “extinction of humans”, we are such a resilient species that we would certainly survive a giant asteroid impact. We are not “due” an extinction at all. Next giant impact is most likely to happen many millions of years into the future. As we'll see, there is almost zero chance of a giant impact in the next century. There is however much we can do to protect ourselves from smaller asteroids. As a result of extensive asteroid surveys over the last couple of decades: We can be pretty sure (as in perhaps 99.999999% sure) that there isn’t an extinction level asteroid headed our way in the next century. We know the orbits of all the Near Earth Asteroids that could do this and none will hit Earth over that timescale. That leaves comets, and the chance of that is something like 1 in 100 million per century, as a very rough guess (since 99% of the impacts are thought to be from asteroids). This risk has been pretty much retired due to the automated asteroid searches by the likes of Pan STARRS. But the chance of a smaller asteroid impact is still high enough to make it worth working on it, especially since this is the one natural hazard we can not only predict to the minute, decades in advance, with enough information but also prevent also, given a long enough timeline. We are already close to completing the survey of 1 km asteroids (90% done). With a bit more funding we could also find most of the asteroids down to 45 meters in diameter. As a result of new developments in the science of asteroid detection, this could be done for a cost of only $50 million to protect the entire Earth. We would then be able to deflect asteroids decades before they are due to hit, which is a far easier task than a last minute deflection. First when he said "You could say, of course, we’re due, but it’s a random course at that point.”" - that is a scientist speaking as a scientist. But of course people sharing this on social media, retweeting, writing new stories about it, pick up the “we are due” and omit the scientific qualification “but it’s a random course at that point”. To say that we are “due” a mass extinction is a bit like saying that after you throw nine heads, you are due to throw a tail. Not true. The chance that the next coin toss is a tail is always going to be 50/50 for a fair coin no matter how many heads you throw. It's the same with extinctions. So long as it is a random process, then an extinction that happens every 60 million years could happen tomorrow or it could be 60 million years or 120 million years before it happens. On average we would still expect to wait 60 million years for the next such mass extinction even if the last one happened hundreds of millions of years ago. It’s just as for the coin toss. Same for an extinction event of a size that happens every 100 million years. If you look at the diagram the big five are irregularly spaced. The last one happened 66 million years ago. But they are irregularly spaced so we can't conclude either that we need to wait 44 million years for the next big extinction either. Some scientists have tried to discern a periodicity in the extinctions of perhaps 26 to 30 million years. If they are right then we are due the next extinction perhaps 15 million years or so from now. But that is very controversial and if true, it wouldn’t cover all mass extinctions. At any rate that's so far into the future it makes no difference to us now, if they are right or wrong. We could get a mass extinction in the next few millions of years. But it is nearly impossibly unlikely in the next century.

#### Newest research from NASA proves any threat is at least a thousand years away

Mack 19 (Eric, “NASA says city-smashing asteroids aren't so common,” 6-27, <https://www.cnet.com/news/nasa-says-city-smashing-asteroids-arent-so-common/>)

Asteroids are all around us, but we shouldn't be losing sleep over the big buggers. A small space rock was spotted just before slamming into the atmosphere last weekend, and over 20,000 near-earth asteroids have been cataloged, but new research from NASA finds impacts that could do serious damage aren't very frequent. Perhaps the last time an asteroid large enough to inflict serious hurt on a limited part of the Earth's surface (we're not talking about an extinction-level space rock like the one that ended the dinosaurs) came knocking was in 1908. In June of that year, the so-called Tunguska Event impacted an unpopulated part of Siberia and was witnessed by only a handful of people, but it flattened 500,000 acres of forest, scorched the Earth and knocked people out of their chairs 40 miles away (64 km). It's easy and terrifying to imagine what the result might have been had chance dictated the impact occurred over a major metropolitan area instead. "Tunguska is the largest cosmic impact witnessed by modern humans," David Morrison, a planetary science researcher at NASA's Ames Research Center in Silicon Valley, said in a release. "It also is characteristic of the sort of impact we are likely to have to protect against in the future." But when researchers revisited the Tunguska Event with the help of computer models and tooked into account the latest data on the population of asteroids in our neighborhood, they found that such major impacts are exceedingly rare. The results, published in the journal Icarus, find that such a powerful impact should only be expected roughly every thousand years or longer rather than once every century or so, as was previously thought. While this is certainly good news for all earthly life forms, the threat of an asteroid impact is still very real and worth preparing for, as the 2013 bolide explosion over Russia reminded us. "A lot of uncertainty remains about how large asteroids break up in the atmosphere and how much damage they could cause on the ground," said NASA researcher and co-author Lorien Wheeler. "However, recent advancements in computational models, along with analyses of the Chelyabinsk and other meteor events, are helping to improve our understanding of these factors so that we can better evaluate potential asteroid threats in the future."

#### Public space based astronomy solves.

NASA 21 “Asteroid-Hunting Space Telescope Gets Two-Year Mission Extension” June 30, 2021 <https://www.jpl.nasa.gov/news/asteroid-hunting-space-telescope-gets-two-year-mission-extension> SM

Asteroid-Hunting Space Telescope Gets Two-Year Mission Extension

NEOWISE has provided an estimate of the size of over 1,850 near-Earth objects, helping us better understand our nearest solar system neighbors.

For two more years, NASA’s Near-Earth Object Wide-field Infrared Survey Explorer (NEOWISE) will continue its hunt for asteroids and comets – including objects that could pose a hazard to Earth. This mission extension means NASA’s prolific near-Earth object (NEO) hunting space telescope will continue operations until June 2023.

“At NASA, we’re always looking up, surveying the sky daily to find potential hazards and exploring asteroids to help unlock the secrets of the formation of our solar system,” said NASA Administrator Bill Nelson. “Using ground-based telescopes, over 26,000 near-Earth asteroids have already been discovered, but there are many more to be found. We’ll enhance our observations with space-based capabilities like NEOWISE and the future, much more capable NEO Surveyor to find the remaining unknown asteroids more quickly and identify potentially-hazardous asteroids and comets before they are a threat to us here on Earth.”

Originally launched as the Wide-field Infrared Survey Explorer (WISE) mission in December 2009, the space telescope surveyed the entire sky in infrared wavelengths, detecting asteroids, dim stars, and some of the faintest galaxies visible in deep space. WISE completed its primary mission when it depleted its cryogenic coolant and it was put into hibernation in February 2011. Observations resumed in December 2013 when the space telescope was repurposed by NASA’s Planetary Science Division as “NEOWISE” to identify asteroids and comets throughout the solar system, with special attention to those that pass close to Earth’s orbit.

“NEOWISE provides a unique and critical capability in our global mission of planetary defense, by allowing us to rapidly measure the infrared emission and more accurately estimate the size of hazardous asteroids as they are discovered,” said Lindley Johnson, NASA’s Planetary Defense Officer and head of the Planetary Defense Coordination Office (PDCO) at NASA Headquarters in Washington. “Extending NEOWISE’s mission highlights not only the important work that is being done to safeguard our planet, but also the valuable science that is being collected about the asteroids and comets further out in space.”

### Ozone

#### No terminal impact in the 1AC, 1AR too new—plant spores not existenail

**Ozone impact is hype – emissions not key, ozone hole not dangerous**

**Ridley 14** -- Matthew White Ridley, 5th Viscount Ridley DL FRSL FMedSci, known commonly as Matt Ridley, is a British journalist, businessman and author of popular science books. Since 2013 Ridley has been a Conservative hereditary peer in the House of Lords. “THE OZONE HOLE WAS EXAGGERATED AS A PROBLEM” http://www.rationaloptimist.com/blog/the-ozone-hole-was-exaggerated-as-a-problem.aspx

***Serial hyperbole does the environmental movement no favours*** My recent [Times column](http://www.thetimes.co.uk/tto/opinion/columnists/article4206440.ece) argued that the alleged healing of the ozone layer is exaggerated, but so was the impact of the ozone hole over Antarctica: The ozone layer is healing. Or so said the news last week. Thanks to a treaty signed in Montreal in 1989 to get rid of refrigerant chemicals called chlorofluorocarbons (CFCs), the planet’s stratospheric sunscreen has at last begun thickening again. Planetary disaster has been averted by politics. For reasons I will explain, this news deserves to be taken with a large pinch of salt. You do not have to dig far to find evidence that the ozone hole ***was never nearly as dangerous as*** some ***people said***, that it is not necessarily healing yet and that it might not have been caused mainly by CFCs anyway. The timing of the announcement was plainly political: it came on the 25th anniversary of the treaty, and just before a big United Nations climate conference in New York, the aim of which is to push for a climate treaty modelled on the ozone one. Here’s what was actually announced last week, in the words of a Nasa scientist, Paul Newman: “From 2000 to 2013, ozone levels climbed 4 per cent in the key mid-northern latitudes.” That’s a pretty small change and it is in the wrong place. The ozone thinning that worried everybody in the 1980s was over Antarctica. Over northern latitudes, ozone concentration has been falling by about 4 per cent each March before recovering. Over Antarctica, since 1980, the ozone concentration has fallen by [40 or 50 per cent each September](http://bigstory.ap.org/article/scientists-say-ozone-layer-recovering) before the sun rebuilds it. So what’s happening to the Antarctic ozone hole? Thanks to a diligent blogger named Anthony Watts, I came across a press release also from Nasa about nine months ago, which said: “ [Two new studies show](http://wattsupwiththat.com/2014/09/12/is-the-atmospheric-ozone-recovery-real-or-just-for-scoring-political-points/) that signs of recovery are not yet present, and that temperature and winds are still driving any annual changes in ozone hole size.” As recently as 2006, Nasa announced, quoting Paul Newman again, that the Antarctic ozone hole that year was “the largest ever recorded”. The following year a paper in Nature magazine from Markus Rex, a German scientist, presented new evidence that suggested CFCs may be responsible for less than 40 per cent of ozone destruction anyway. Besides, nobody knows for sure how big the ozone hole was each spring before CFCs were invented. All we know is that it varies from year to year. How much damage did the ozone hole ever threaten to do anyway? It is fascinating to go back and read what the usual hyperventilating eco-exaggerators said about ozone thinning in the 1980s. As a result of the extra ultraviolet light coming through the Antarctic ozone hole, southernmost parts of Patagonia and New Zealand see about 12 per cent more UV light than expected. This means that the weak September sunshine, though it feels much the same, has the power to cause sunburn more like that of latitudes a few hundred miles north. ***Hardly Armageddon***. The New York Times reported “an increase in Twilight Zone-type reports of sheep and rabbits with cataracts” in southern Chile. Not to be outdone, Al Gore wrote that “hunters now report finding blind rabbits; fisherman catch blind salmon”. Zoologists briefly blamed the near extinction of many amphibian species on thin ozone. [Melanoma in people](http://www.wunderground.com/resources/climate/holefaq.asp?MR=1) was also said to be on the rise as a result. This was nonsense. Frogs were dying out because of a fungal disease spread from Africa — nothing to do with ozone. Rabbits and fish blinded by a little extra sunlight proved to be as mythical as unicorns. An eye disease in Chilean sheep was happening outside the ozone-depleted zone and was caused by an infection called pinkeye — nothing to do with UV light. And melanoma incidence in people actually levelled out during the period when the [ozone got thinner](http://www.heritage.org/research/commentary/2007/09/ozone-the-hole-truth)

. Then remember that the ozone hole appears when the sky is dark all day, and over an uninhabited continent. Even if it persists into the Antarctic spring and spills north briefly, the hole allows 50 times less ultraviolet light through than would hit your skin at the equator at sea level (let alone at a high altitude) in the tropics. So it would be bonkers to worry about UV as you sailed round Cape Horn in spring, say, but not when you stopped at the Galapagos: the skin cancer risk is 50 times higher in the latter place. This kind of eco-exaggeration has been going on for 50 years. In the 1960s Rachel Carson said there was an epidemic of childhood cancer caused by DDT; it was not true — DDT had environmental effects but did not cause human cancers.

#### No impact to Ozone hole-climate change overdetermines, also unknown causes

Hand 2/10/16. Eric Hand is a staff writer who writes about planetary issures. <http://www.sciencemag.org/news/2016/02/record-ozone-hole-may-open-over-arctic-spring>, Ben Bernstein

Lingering atmospheric pollutants and a blast of frigid air have carved an unusually deep hole in Earth’s protective ozone layer over the Arctic, and it threatens to get deeper. Atmospheric scientists are analyzing data from weather balloons and satellites for clues to how the ozone will fare when sunlight—a third factor in ozone loss—returns to the Arctic in the spring. But they are already worrying about how extra ultraviolet light might affect humans and ecosystems below and wondering whether climate change will make such Arctic holes more common or severe. Record cold temperatures in the Arctic stratospheric ozone layer, 15 to 35 kilometers up, are the proximate cause for this year’s losses, because they help to unleash ozone-destroying chemicals. “This winter has been stunning,” says Markus Rex, an atmospheric chemist at the Alfred Wegener Institute in Potsdam, Germany. By next week, about 25% of the Arctic’s ozone will be destroyed, he says. This time of year, the stratosphere tends to warm up with the breakdown of the polar vortex, a cyclone that traps cold air. But if a strong vortex persists another month as light returns to the Arctic after the dark winter, ozone losses will get much bigger, Rex says. Conditions are ripe for losses to surpass a record Arctic ozone hole observed in the spring of 2011, he adds. At Earth’s surface, ozone is a caustic chemical and a health hazard. But in the stratosphere, it shields the planet from ultraviolet light. Scientists noticed in the 1980s that chlorine-containing chemicals commonly used in refrigerants were reacting to form compounds that ate away stratospheric ozone, especially over the poles. The 1989 Montreal Protocol led to the phaseout of those chemicals, but their long atmospheric lifetime means that seasonal ozone losses will persist well into this century. Every year, a major ozone hole opens up over Antarctica, where winters are colder and polar vortices are stronger and more stable than over the Arctic. But this year, the Arctic could be the poster child. Cold temperatures have allowed nitric acid, mostly from natural sources, to condense and form the peculiar, iridescent clouds that have been spotted all over northern latitudes this winter. “They’re beautiful, but once I see them, I’m concerned—they’re dangerous,” Rex says. That’s because the clouds catalyze the reactions that mobilize chlorine into active chemicals that can react in the presence of sunlight to destroy ozone. An instrument on the NASA AURA satellite has detected record lows of the inert forms of chlorine and rising amounts of the active ones, notes Gloria Manney, an atmospheric scientist at NorthWest Research Associates in Socorro, New Mexico. “Conditions are primed,” she says. “The last ingredient we need is sunlight.” Weather models are predicting some warming of the stratosphere this week, she adds, but probably not enough to halt the ozone destroying brew. The Arctic vortex tends to behave erratically, with blobs of cold air often dipping into more heavily populated northern latitudes. The influx of ozone-poor air could cause problems for people there, who are unused to wearing sunscreen in March, Rex says. “If we get such a deep minimum, then people need to be informed,” he says. The extra radiation could even adversely affect phytoplankton, which typically bloom in the Arctic Ocean each spring, Rex suggests. Ross Salawitch, an atmospheric chemist at the University of Maryland, College Park, says the health hazards shouldn’t be sensationalized. “The worst-case scenario would be folks in high northern latitudes being in a type of ultraviolet environment that people are exposed to all the time in San Diego.” For Salawitch, the bigger question is what role climate change might be playing. The notoriously mercurial polar weather is the main factor determining how much ozone is destroyed each spring, he says. But climate change is also expected to cool the stratosphere over the long run. The same greenhouse gases that trap heat in the lower atmosphere allow the stratosphere to more effectively radiate energy into space. On its own, the stratospheric cooling could make bad ozone years in the Arctic more common. It should also make polar vortices stronger, and more stable. But there is evidence that storminess at lower latitudes—another thing that is expected to increase in a warming world—will make stable polar vortices less common. Which effects will win out? Salawitch offers a parallel to hurricanes. Climate change is expected to make tropical hurricanes less frequent but more intense. Persistent Arctic vortices, too, could become scarcer but stronger. “When you have cold winters, they tend to be whoppers.” And that could mean that Arctic holes like this year’s could get deeper in the future.

#### Ozone hole is increasing – flips U/Q.

Horton 21 Helena Horton 9-15-2021 "‘Larger than usual’: this year’s ozone layer hole bigger than Antarctica" <https://www.theguardian.com/environment/2021/sep/16/larger-than-usual-ozone-layer-hole-bigger-than-antarctica> (Environmental Journalist for the Guardian)//Elmer

The hole in the ozone layer that develops annually is “rather larger than usual” and is currently bigger than Antartica, say the scientists responsible for monitoring it. Researchers from the Copernicus Atmosphere Monitoring Service say that this year’s hole is growing quickly and is larger than 75% of ozone holes at this stage in the season since 1979. Ozone exists about seven to 25 miles (11-40km) above the Earth’s surface, in the stratosphere, and acts like a sunscreen for the planet, shielding it from ultraviolet radiation. Every year, a hole forms during the late winter of thesouthern hemisphere as the sun causes ozone-depleting reactions, which involve chemically active forms of chlorine and bromine derived from human-made compounds. In a statement Copernicus said that this year’s hole “has evolved into a rather larger than usual one”. Vincent-Henri Peuch, the service’s director, told the Guardian: “We cannot really say at this stage how the ozone hole will evolve. However, the hole of this year is remarkably similar to the one of 2020, which was among the deepest and the longest-lasting – it closed around Christmas – in our records since 1979.

#### Public space tourism will fill in mass launch

Seedhouse 18 [Erik, editor at the Encyclopedia Britannica, “Space Tourism” https://www.britannica.com/explore/space/space-tourism/]

Space tourism, recreational space travel, either on established government-owned vehicles such as the Russian Soyuz and the International Space Station (ISS) or on a growing number of vehicles fielded by private companies. Since the flight of the world’s first space tourist, American businessman Dennis Tito, on April 28, 2001, space tourism has gained new prominence as more suborbital and orbital tourism opportunities have become available. Orbital space tourism The advent of space tourism occurred at the end of the 1990s with a deal between the Russian company MirCorp and the American company Space Adventures Ltd. MirCorp was a private venture in charge of the space station Mir. To generate income for maintenance of the aging space station, MirCorp decided to sell a trip to Mir, and Tito became its first paying passenger. However, before Tito could make his trip, the decision was made to deorbit Mir, and—after the intervention of Space Adventures Ltd.—the mission was diverted to the ISS. Tito, who paid $20 million for his flight on the Russian spacecraft Soyuz TM-32, spent seven days on board the ISS and is considered the world’s first space tourist. However, given the arduous training required for his mission, Tito objected to the use of the word tourist, and since his flight the term spaceflight participant has been more often used to distinguish commercial space travelers from career astronauts.