

**Demetri Kofinas:** What's up everybody? Welcome to another episode of Hidden Forces with me, Demetri Kofinas. Today, I speak with Joan Freese. Joan is a Professor of National Security Affairs at the US Naval War College. She's been a faculty member at the Asia-Pacific Center for Security Studies and the Air War College, which emphasizes the employment of [00:00:30] air, space, and cyberspace in joint operations. Professor Freese has also served on the Space Studies board of the National Academies of Science and has often testified before Congress on space security issues. She's the author of multiple books on space security. Among them, Heavenly Ambitions: America's Quest to Dominate Space, The Chinese Space Program: A Mystery within a Maze, and her latest book, Space Warfare in the 21st Century.

In this episode, we go into outer [00:01:00] space. Not just into the low Earth orbit of the International Space Station, but all the way to high geostationary orbits. More than 22,000 miles above the earth's equator where some of our most valuable and vulnerable satellites operate. We will look at what the United States, China, and Russia are doing in space, what our militaries are doing. We learn about ASATs, kinetic orbital strikes, and kinetic kill vehicles. We learn that the use of current anti-satellite technologies [00:01:30] can create a wall of debris in Earth's orbit so thick that we would be unable to launch anything into space, including satellites, our space station, and any space missions to Mars and beyond for generations.

Any and all satellite communications would go dark. Global distribution networks, including our food supplies, energy and transportation would grind to a halt. The global banking and financial system would collapse. Our communication infrastructure would be devastated. [00:02:00] The implications of war in space are catastrophic. And yet, the public is largely unaware of the dangers orbiting right above our heads. It's high time we take notice.

As always, you can gain access to reading lists put together by me ahead of every episode by visiting the show's website at [hiddenforces.io](http://hiddenforces.io). If you are listening to this show on iTunes or Android, make sure to subscribe. If you like the show, write us a review. And if you want a sneak peek [00:02:30] into how each episode is made or for special storylines told through pictures and questions, like us on Facebook and follow us on Twitter and Instagram @hiddenforcespod. Lastly, there are a number of moments in this interview where you may hear changes in our guest's audio. We did our best to fix the problem, and I hope it will not detract from your enjoyment of this incredibly valuable discussion. And now, time for this week's conversation.

[00:03:00] One of the things that fascinates me is the lack of, not necessarily publicly available documents, the documents are there, but contextualized documents and engagement with the public. This is an area that's remarkably ... There isn't a great deal of exposure to the public and it's ironic given the fact that space is an area of intrigue and excitement and romance as it's fictionalized on screen and how the public thinks about it and also with SpaceX and Blue Origin and what the private sector is doing. But one of the things I was doing [00:03:30] before we spoke, before we had a chance to speak again today, is I looked at some testimonies you gave. And that really, to me, was a very

instructive experience seeing the breadth and variety of opinions, also seeing of course the Congressional industrial apparatus at work, but also seeing the spectrum of posturing and positioning of different people. And that's something I want to get into.

So, I guess at the top, what I'd like for you to do for us is to give us that [00:04:00] context that I felt was so missing in my own research. Give us a framework for understanding the issue or the problem. If you could frame the dilemma that we face in space in once concise statement. I know that's a difficult ask. But if you could frame that at a very high level, top level, and then we can drill down. I'd love to hear what you have to say about that.

**Joan Freese:** 95% or more of space technologies, dual-use technology, and [00:04:30] that fact alone sets the context for the space development, space security dilemma. Because what dual-use technology means is that a single piece of hardware or software can be used for either civilian or military purposes. And if it's used for military purposes, it's very difficult to tell if it's for offensive or defensive purposes.

So, what that means is a remote-sensing [00:05:00] satellite doesn't know or care if it's taking imagery for urban planning or weapons targeting. But the people who control that technology care very much and that sets up a dilemma because you have an entire group of people who rely on space technology for civilian everyday life. And of course, the best example of that is the way we have integrated GPS into our life. While on the other hand, you [00:05:30] have a group of individuals who would like to protect and keep separate as much of this technology as possible because it has potential to be used against national interest, and in fact is a weapon.

**Demetri Kofinas:** All right. So, in what you just said, you're touching on a few things. So dual-use refers to of course the fact that anything for the most part could be a weapon in space. Anything that has the capacity to move its position in fact can be a weapon. And it [00:06:00] can use I think, I don't know if you said it, but it's called kinetic energy or something to that effect, which is basically you could just slam a satellite into another satellite or you could have functionality on a satellite that enables you to move to a neighboring satellite and drag it to some other location or jam its software. Which is actually another thing I want to get into, which is to what extent do you even need to deal with a satellite in physical space and simply attack it via the internet or via software or the ground station. So, we can get into that as well.

But [00:06:30] what I think is interesting, and I want to make sure our audience gets the full scope of this as we're talking, what you're touching on with this respect to dual-use is the fact that there are a certain number of actors who are interested in space. So of course, there are us, just normal people. Maybe you're ... Well, you're professionally employed in the area, so it's a bit different. But for the vast majority of people, we have an interest in space. We have an interest in space roughly in the same way that we have an interest in air or we have an interest in our environment, something that it's a [00:07:00] common area.

Then there are other actors as well. There is the United States military. There's the Chinese military. There are militaries all over the world. There are commercial entities. So, there

are these different actors. Talk to us a little bit also about what that ecosystem looks like. And I'd love to also, because this is something else that I realized when I delved into this a bit deeper. And again, to add an extra point of what fascinates me so much about the subject, to me this feels like a strong holdover from the Cold War. One of the few area [00:07:30] perhaps, along with the nuclear arsenal and nuclear deterrents, that we still have a lot of systems, protocols, technologies in place that were Cold War, pre-Cold War technologies, pre-Cold War protocols that we still have today.

And so, there are interested parties that are still acting largely ... To what extent there's accountability is something that I'd like to talk about because I'm not sure. I know that certainly there's a lot of concern on the U.S. side as far as [00:08:00] what is the accountability on the Chinese side because that's how the American military seems to define The Chinese People's Liberation Army and the government as their prime adversary, to what extent there is communication between the army and the government on their end. So, there are all these different actors, all these different interests competing. Can you try and give us your best overview of what that ecosystem is?

**Joan Freese:** Well, you're correct that space security and space development is one [00:08:30] of the last vestiges of Cold War thinking. And that again goes back because it's dealing with dual-use technology. But space did not develop in a normal way. In fact, since the 50s, people have been talking about space development and the normalization of space development. And what that means is in areas like aircraft, you had the public sector, the government making an initial investment to allow the technology to develop. It's seed money. [00:09:00] And then you had the private sector taking over and taking it forward.

So, with airplanes, there were contracts given for private sector entities to deliver the mail. And if they could deliver the mail, they got paid and they could develop further technologies. But with space, that hasn't happened. It's been dominated by government actions, government development. The fact that we're still using, basically [00:09:30] have been using the same kind of rockets as we used during the Gemini and Apollo program now 50 years plus later says that we haven't developed as we would with airplanes, with cars, with computers.

And that's largely, again, because space is very expensive and very high-risk. And it's only been governments that have been able to make that kind of investment. The commercial companies that developed were there to [00:10:00] feed into government plans.

**Demetri Kofinas:** Raytheon and those companies.

**Joan Freese:** Yes. Boeing, Lockheed, Raytheon, they feed in. And again, going back to dual use, they would feed in through a space division, which would be building technology to launch satellites. And they would feed in through a defense division, which would be building missiles. And one of the things I always present to my classes is what's [00:10:30] the difference between a rocket that has a very futuristic and positive connotation and a missile, which is of course a-

**Demetri Kofinas:** Payload.

**Joan Freese:** And it's largely trajectory in payload. There are some other differences, but it's for the most part payload. So, if you look at it from that respect, you've got this giant government program that is fed into by the commercial entities that develop to accommodate. [00:11:00] And they can make a lot more money in the defense side than they can the space side and the civilian side. So that sets up right there a huge lobby and part of this environment that can make a lot of money from keeping space primarily a defense realm.

And when you were saying earlier how little information there is that puts it into context, it's because it is primarily [00:11:30] an area of defense and it's very high-tech. So, it's easy to just basically tell the public, "Don't worry. We got it. This is too complicated." And you start throwing around words like exo-atmospheric and dregs and all those things. And people say, "Yes. Yes. You just go handle it. We're fine."

So, there's been this commercial government synergy that has a very strong defense portion to it, [00:12:00] which has also created a revolving door between the government and the commercial side in terms of most of the people who run the commercial sector, especially the defense sector, are former members of the military or part of the government security sector. So, there's very much of a vested interest in self-serving actions.

And then more recently, you have these what [00:12:30] are called new space companies where you have billionaires basically investing their own money to go beyond this environment that has been prolonged much too long and start saying, "No. We're going to start investing in the space side, in the development side that has really never occurred before. And we're going to build new rockets. And we're going to build habitats. And we're going to do things like mining." And it really sets [00:13:00] up the kind of development that many people expected to happen 50 years ago and never did.

**Demetri Kofinas:** The Falcon 9 rocket developed by SpaceX is a full-thrust, partially reusable launch system. So that's further to your point.

**Joan Freese:** Right. Also, again you have these think tanks that provide reports in terms of what's needed, how do we do it. And most of these think tanks are funded by the commercial sector that supports the government. So, there's this self- [00:13:30] perpetuating threat and need to address the threat. And there's a lot more money to be made in building missiles and technology than there is diplomacy.

**Demetri Kofinas:** And that's the classic military industrial Congressional complex that Eisenhower warned about.

**Joan Freese:** Eisenhower would be rolling over in his grave right now at what has happened with the military industrial complex in this space [film 00:13:59] area.

**Demetri Kofinas:** You also [00:14:00] touched on this notion of congestion or contestation or competitiveness - this changing aspect with respect to some of these private companies. So the other thing though that I wanted to say before we move on from that context that we're describing is I noticed something else in my research for this, which is in addition to this being a holdover from the Cold War period, in that same sense, it also is a holdover it seems from the period right after the fall of the Cold [00:14:30] War and the notions of full-spectrum dominance and this desire by the United States military to achieve a level of superiority. Get the high ground, which in this sense quite literally is the high ground and to maintain that type of a posture.

It seems that that still is the mentality amongst certain people in the military and perhaps even in the government and in the Congress. Could you speak a little bit about that as well in terms of what the variety is of [00:15:00] views of, not just the inevitability of war in space, which is something I want to get into, that there are people that actually feel that it is completely inevitable and that we just simply have to prepare for it and also what the aims and objectives are of people within positions of power and how that really affects the entire process of diplomacy? Which from my perspective having coming at this really as a layperson entirely, it seems given the vulnerabilities of space, given the vulnerabilities of satellite [00:15:30] technology, and the vulnerability of society as a whole and its dependence on space, it seems that diplomacy is the only way forward because any war in space would be catastrophic for our satellites.

And I'll ask within that context as well, from what I ... It seems to me we have about half of satellites in space are American, whether they're civilian, commercial, or government military. So, it would also be worse for us. But anyway, that was a bunch of stuff I threw [00:16:00] at you. I just wanted to get it out there. Please continue.

**Joan Freese:** So, let's go to the description of space that you clearly found that's used repeatedly: Congested, contested and competitive. It is increasingly congested because previously the only two countries that could really afford to put anything into space was the United States and the Soviet Union. Again, it's very high risk, very expensive. And so, it's been this government domain. And now [00:16:30] increasingly, other countries are intent in not being left out of the advantages of space and those are primarily again through information technology. And so, it's not just the United States and the Soviet Union, now Russia, but China has a great interest in having space technology available to their population and to their military.

Most of the countries in Europe. You have countries like Vietnam wanting to launch their own satellite [00:17:00] because having a satellite is a very prestigious event. And it basically says, "We are developing." So, you have Nigeria, Vietnam, and other countries becoming very involved. And the more that's put up into space, the more congested it is.

Well, there's a downside to that. You have to be very careful to monitor where things are so that you don't have collisions. But that also indicates that more people are using space. It's more or less inevitable [00:17:30] through development unless we have intended that space was going to be the exclusive purview of the United States.

**Demetri Kofinas:** Which seems to be an idea that some do have in the military and in government.

**Joan Freese:** Well, exactly. And that's because, again, when only the United States and the Soviets could go into space, we began to put very high value satellites into a very high orbit and we've referred to it as the sanctuary orbit. We refer to the satellites as exquisite satellite.

**Demetri Kofinas:** [00:18:00] And you're referring to high orbit, like satellites and geostationary or geosynchronous orbit.

**Joan Freese:** Yeah, it's basically high orbits that are very valuable geostationary. And we refer to it ... The fact that we refer to it as sanctuary orbit basically says, "It's ours." As other countries are getting better at their technology, they are getting closer to those orbits, which we have deemed ours. And that is seen as a major [00:18:30] security risk. Well, that basically is saying we have claimed this real estate as only. And according to the Outer Space Treaty, which the United States has signed, everyone has equal free access to space. So, there's a contradiction there. So that's congested.

Then there's competitive. Well, again, that basically says it's no longer the United States and the Soviet Union, Russia. [00:19:00] And that's inherent if you're going to develop. The part that is most focused on by the security community is the contested. And that basically goes back to that sanctuary orbit or that sanctuary orbit basically saying, "Things that we considered ours and only ours aren't just ours anymore." Other people are contesting our right to exclusivity. [00:19:30] And that is a major threat to the security community.

So, you have this environment of congested, contested, and competitive, which can either be viewed as threatening or it can be viewed as an inevitable portion of developing space. And it really has to be viewed as both. But how do you deal with that?

So, there are many people who view that, again, the United [00:20:00] States must have full-spectrum dominance, including the high ground. Well, let's talk about the high ground for a minute. If you're in the Army and you get onto the high ground, the assumption is it's a good place to be because you can see everybody else and you can hide. You can get behind that rock and people can't get to you. But the high ground in space is basically saying, "You are a bright identifiable object traveling in a certain pattern or orbit against a dark sky, you're a [00:20:30] sitting duck." It doesn't give you the same kind of high ground.

Now, what it will do, what satellites will do is give you 24/7 access in terms of reconnaissance to areas that you might not have access to otherwise. So, this high ground analogy goes only so far. And then there's the inevitability piece. Is space war inevitable? And of course, we owe that attribution to Donald Rumsfeld, [00:21:00] who basically argued that all other domains, ground, air, and sea, have become battlefields; therefore, it is inevitable that space will as well.

**Demetri Kofinas:** That's also the expressed view of the Commander of US Strategic Command, John Hyten.

**Joan Freese:** Yeah, it went away for a little while and now it's back in full force. And it came back after the Chinese had a launch in 2013, which nearly reached [00:21:30] the sanctuary orbit. And basically, that changed the entire U.S. posture from one of strategic restraint, where we won't develop technology if you won't develop technology, certain threatening technology. Because we've never ... The United States or any other country has never crossed the line, crossed the Rubicon from developing dual-use technologies that could be used as weapons to overtly developing weapons.

[00:22:00] And there's now this push, and ironically this is rather 1984-ish, we are still not saying we're going to develop weapons. Instead we say, "We're going to develop offensive counterspace technology."

**Demetri Kofinas:** I didn't immediately catch that Orwell reference. I thought you were referencing the 1985 ASAT test where we shot down Solwind and created all that debris.

**Joan Freese:** We have tested ASATs in the 80s. We've tested ASATs [00:22:30] far more recently. We used missile defense technology to shoot down one of our own satellites that was malfunctioning after the Chinese tested their anti-satellite technology in 2007. So, we don't have space weapons. We have offensive counterspace technology. Think about that for a minute. What does that mean? What is offensive counterspace? That means if we feel threatened, we have the technology [00:23:00] to defend ourselves. Well, that's a weapon. And the fact that you can use it offensively says we might not even wait for somebody else to use theirs first. Offensive counterspace. So that's where we are right now with this large group of vested interest individuals and those who are very sincerely concerned about U.S. national security, don't get me wrong, pushing harder than we have since [00:23:30] the George W. Bush administration for a position of space war is inevitable. And this is being fed blatantly by certain media reports. There was one on 60 Minutes.

**Demetri Kofinas:** Oh, I saw that. Yeah.

**Joan Freese:** Which are basically advertisements for the Air Force budget. "We need more money so we can build more stuff to defend you against this inevitable threat, which [00:24:00] is looming."

**Demetri Kofinas:** So, you referenced the two Chinese tests. I think it's important for our audience, many who won't necessarily know what you're referring to. One is the 2007 test in which the PLA blew up their own satellite creating much larger debris field than anything we've done and we've done plenty ourselves. And be we, I mean the U.S. military and the U.S. government. They created tremendous debris field, which is only now beginning to, from what I understand, [00:24:30] affect our satellites and affect our International Space Station. From what I understand, we also move the ISS, the space

station, out of the way of our debris every year or more. And so now we have that in addition with China. And the debris field is something I want to get into.

But I also want to use that as part of a question as well around communication. Because what I think we saw with respect to the Chinese test was [00:25:00] them sending us a signal, sending us a message. And I wonder, and there's some alarm from me when I look at this subject, I wonder to what degree we really understand the Chinese and to what degree we seem to be on an institutional level even interested in understanding the Chinese and their intentions when it seems Congress has gone out of its way to make it explicitly clear that we should have very limited engagement with China. And our company should have limited engagement [00:25:30] with the Chinese when it comes to space.

**Joan Freese:** Right. In 2007, the Chinese blew up one of their own satellites very irresponsibly in a high orbit that is going to ... It doubled the amount of debris in orbit, and it's going to affect space operations for a very long time. A little bit of background on that, the Chinese ASAT was built by their general armaments division, which is part of the military. It develops [00:26:00] technology. They're roughly equivalent to DARPA in some ways in that it's their job to build new stuff.

Well, they're a bunch of engineers. What do engineers want to do when they build something? They want to test it. They want to use it. So, the Chinese, before doing the kinetic impact test, did flybys, very obvious flybys that they knew the United States government could monitor. They [00:26:30] did at least two, maybe three. I honestly don't remember. But they did these flybys and the United States said nothing.

**Demetri Kofinas:** Which I find remarkable. Having also read about that, I find that absolutely remarkable.

**Joan Freese:** Well, it could be for a variety of reasons. It could be because we wanted to see how good their technology was. It could have been because we wanted to not acknowledge how closely we could watch what they were doing. It can also be just for [00:27:00] political reasons of let's see what they'll do. They finally did the, again, kinetic test, which hitting a satellite in that high of an orbit was bound to create debris. The Chinese knew they were creating debris. Actually, their debris calculations were right on target. But when it was presented to the decision makers, it was presented in such a way that it seemed reasonable. And they went ahead and did the test.

**Demetri Kofinas:** There's also a bit of an irony there as well. Maybe not so much an irony. [00:27:30] But of course, our expectations around communication and concepts of distance stem from our technological innovations over the decades, and specifically in the domain of the military. Space represents the center of our command and control infrastructure for the U.S. military and of course for the Chinese to the extent to which they want to modernize their military.

One of the things that seems very scary about space that sticks out to me [00:28:00] in particular, making it worrisome, is that any type of engagement in space that could create

unforeseen consequences in terms of collateral damage could knock out communication infrastructure that then effectively turned the United States or the Chinese or any modern military into a very large, dangerous, and erratic military machine, blind and deaf.

**Joan Freese:** Absolutely.

**Demetri Kofinas:** How large of a concern is that?

**Joan Freese:** Well, that's one of the ... Every year, there is a space war game [00:28:30] called the Schriever Games. And what is released after the Schriever Games, there's an unclassified report and then much of it is classified. But what we know from the unclassified report is that escalation happens quickly because there are these doubts about what happened and we can't wait to see if it was nefarious or not. We have to assume. Especially, what if it's one of our early warning satellites that becomes defunct, malfunctions? Do we [00:29:00] assume that that was nefarious so that we couldn't see a missile launch or a nuclear launch? And that's one of the big concerns is this tendency towards rapid escalation.

**Demetri Kofinas:** Oh, of course. And historically, there are many reasons for us to worry about the information coming from our early warning systems, even if they're functioning. I'm just thinking of the 1979 case where a technician had accidentally run a war game at NORAD, and [00:29:30] we almost went to war. Or 1983, the false alarm on the USSR side.

**Joan Freese:** Yes, exactly. Just as there is a ... Just as when engineers build technology, they want to use it. When you have a weapon in your arsenal and you are unsure of where the threat is coming from, there's a tendency to use it.

**Demetri Kofinas:** All right. And just to clarify, we've used the term ASAT frequently during this interview. ASATs refers [00:30:00] to anti-satellite weapons. And when you're talking about kinetic, again to reiterate, when you were saying that the Chinese were flying by their other satellite, what they were doing was they were ... The threat was that they would ram into their satellite. And that is how they disabled it and broke it into pieces.

I want to clarify one other thing on debris. And then I want to move to other weapons. Specifically, I've read a little bit about this idea of rods from God, this notion that there is an interest in weaponizing [00:30:30] space for more traditional purposes and I wanna get your take a little bit on to what degree that is actually real or science fiction. But with respect to debris, I do want to wrap this part up and make sure that our audience understands the significance of it.

What I've read, and I would like you to illuminate me on this, what I've read about the debris field and its potential, we've only destroyed a fraction of the satellites that exist in orbit. We also create debris [00:31:00] when we go into space, when we release boosters from our rockets. But the amount of potential debris out there is huge. And the amount of debris that we would create in the event of hypothetical war scenarios in space I've read

could be so devastating that we would not be able to exit Earth orbit for hundreds if not many more years.

How accurate is that? Is that an understatement? Is that an overstatement?

**Joan Freese:** Most people are [00:31:30] familiar with space debris from the movie, Gravity, where they took some fictional license and began the movie with one satellite hitting another, creating debris, which then hit other satellites, and this chain effect took over and everything was blowing everything else up. And that was, again, there was definitely some fictional license going on there. But there is this idea that when something, when there's debris in orbit, it can become itself a weapon. [00:32:00] The space shuttle on a regular basis used to have to have its windshield replaced after being hit by something the size of a paint fleck from a rocket boost.

**Demetri Kofinas:** Which is a remarkable point. A paint chip because of the fact that it was moving at such speed was able to generate a force large enough to crack a windshield, which is remarkable.

**Joan Freese:** Right. And something the size of a quarter [00:32:30] could be catastrophically damaging. So, there is this very real risk in terms of ... It's interesting. General Hyten has now said that the one thing that he is adamant about is do not create debris. So, there is a recognition in all communities that debris creation could have catastrophic results and could cripple basically not only the military, but cripple [00:33:00] satellites that we rely on every day for daily life. So yes, debris has been acknowledged within all communities as something to be avoided.

There are different technologies to be considered, but then you have to start thinking about do you want to go for the really big pieces? Do you want to send up something that's like a grappling hook to reach out and grab onto an old rocket booster that's the size of a school bus? Interesting, [00:33:30] the legal issues involved there. There are no salvage laws in space. So, everybody owns every piece of junk floating around. And you just can't go up and clean it up.

But then maybe you want to go for the small stuff and you want to try and clean out all that paint debris, the little stuff that can be just as damaging. And some of the ways that have been suggested to do that is to basically put out a foam cloud [00:34:00] that would catch it all. And then you de-orbit the foam cloud. So, there's different ways to do it. But what would it take? It takes a lot of money. And it takes a lot of international cooperation, which we are not ... We don't have a lot of right now.

**Demetri Kofinas:** That's interesting. So, you just illuminated me. How would that work? So, a few things. One, I don't know if you know the exact number, I don't. But from what I've been able to gather, from low [00:34:30] to high Earth orbit, the volume of that space is much larger than anything we encounter on Earth. In order to manage that, it seems an overwhelming task. And I certainly did not come across any information about

technology, so that's very interesting. How does that work? And how realistic is that proposal?

**Joan Freese:** Well, there's lots of proposals. There're proposals to use lasers to basically, if you want to de-orbit a large piece of debris, you slow it down and [00:35:00] it will fall from orbit and burn up in the atmosphere. But when you start shooting lasers into space, that makes people very nervous. So, there's laser technology, there is again this idea of a grappling hook. But you latch onto something that's been in orbit for 40 years, it could just crumble. You could create debris, rather than solve the problem.

**Demetri Kofinas:** And of course, these are large pieces of debris you're describing. They're not the paint chips or the quarters.

**Joan Freese:** These are school bus size [00:35:30] pieces of debris. And then again, there's the smaller debris that there's proposals to capture them with the foam. There're proposals to capture them with basically a vacuum. And it's interesting, the scientists working on these different proposals are very cooperative with each other for the most part. It's the governments that can't cooperate. We could make the technology happen, but it's the politics [00:36:00] that's the stumbling block.

**Demetri Kofinas:** That's interesting. After this interview, I certainly am going to go read into those technologies because again ... And that just speaks to the challenge I face. And I think to some extent, you may not even be familiar with it because of the fact that you work in this field and you're so aware of this information and where to get it. But I can tell you that coming to it from my perspective, I have not had harder time researching a subject that I know little about than this.

**Joan Freese:** For example, the space debris information is going to be in very technical [00:36:30] journals. It's not information that citizens, laypeople, generally come across unless there's an occasional article in Popular Science or Popular Mechanics or something of that nature. It's all very technical.

**Demetri Kofinas:** And this is all integrated. Space is integrated with every other weapons platform and system that the U.S. military has and I guess increasingly the Chinese and the Russians to which they look to expand their capabilities. And [00:37:00] so it's not so much where does space, from my understanding, where does space reside on a hierarchy of importance. It's that all these pieces are interconnected. And having a negative outcome in space could create all hosts of problems, including just issues with communication and protocol and exchange and first strike, etc., etc.

**Joan Freese:** The point that's usually made on that is information from space technology isn't somewhere, it's everywhere. That's [00:37:30] the simple statement of what you said in more words. It's that space is not an entity to the side. Space is a provider of information critical across the board for the U.S. military and for the populace. I don't think people understand that when they go use their bank card, they're using GPS.

**Demetri Kofinas:** ATM.

**Joan Freese:** Yeah, when you pay for your gas at the gas pump, [00:38:00] you're using space technology. That when a firetruck leaves the firehouse, it finds you through space technology. The fact that you can watch the Olympics on television, real time. Again, it gets into space is integrated into our everyday life to an extent that if it were suddenly not available, it would be far more painful than people realize.

**Demetri Kofinas:** I think that absolutely. [00:38:30] And I think that that's actually increasingly true for many aspects of society because we've increasingly scaled our society with technology and rely increasingly on all these different complex systems that we don't understand and that are vulnerable, increasingly vulnerable.

**Joan Freese:** In terms of the military, it's interesting to note that the United States has integrated space into its military platforms and its military operations to the point that the Chinese refer to it as our potential Achilles [00:39:00] heel. And they are integrating space technology into their military operations with a very keen eye towards not becoming as dependent upon it as the United States has.

**Demetri Kofinas:** And we demonstrated that really with Gulf War I. I think that was the first place where we really showed our capability.

**Joan Freese:** And increasingly with every war since. The number of precision guided weapons that were used from the first Gulf War to [00:39:30] current operations has just increased substantially. So yes, and that again, that pumps up the "we must protect these assets because we are so reliant on them," which is a very real threat. But the problem comes back to what is the best way to protect this valuable space technology.

**Demetri Kofinas:** Now, to go back to a reference I made earlier to rods from God, this proposal [00:40:00] by members of the military community to put actual weapons into space that could hit targets on earth without the need for payloads, but that would actually generate the equivalent destructive power of a megaton nuclear bomb. Is this something the military is seriously considering? Or is this total science fiction? Because this takes it to another level beyond our conversation about ASATs and attacks from satellite to satellite or affecting communications.

**Joan Freese:** [00:40:30] Rods from God is a concept. As far as we know, it's never been built. I'm quite confident it hasn't. But it's a concept that's been discussed because what it would do, it would fire these tungsten rods to Earth so that the impact would be that of a nuclear weapon, but without the radiation. So when would you use something like that? They're bunker busters. They could get deep into the [00:41:00] Earth without causing the radiation that is associated with nuclear weapons.

It has been, at various times, billed as a rapid response. But what we have, what scientists have shown is we could do much the same thing quicker and faster from Earth with land-based missile systems. So, some [00:41:30] of this gee-whiz stuff is the function of people

whose jobs it is to sit around and think of gee-whiz stuff. And much of that in the military, that's your job. It's not necessarily to build it and use it, but to, "What could I possibly do?" We joke about somebody has the job of trying to invent unobtainium or impossibilium. And rods from God was one of those gee-whiz crazy [00:42:00] ideas, which I think luckily was not built.

The idea of having this weapon orbiting above people's heads to fire these rods down, I think would be terrifying. It's the idea of putting a laser in space. That too would be terrifying for a lot of people and rightly so. So, do we need to cross this Rubicon of space weapons? And [00:42:30] how do we define a space weapon? Is it just those that are ground to space that are by kinetic impact? Or is it using cyber technology to interfere with the communications? Or again, taking out the ground station so that you can't receive the information.

Because we cannot or we have not been able to define a space weapon, there [00:43:00] is this large community that says, "Well, then it's beyond the realm of arms control. If you can't define what it is, you can't subject it to arms control." And that further pumps up the spiral of inevitability, of full spectrum of high ground, of all of that that feeds into the weapon scenarios.

**Demetri Kofinas:** So, I want to get to that rules of the road thing, how we could go about creating some type of diplomatic framework, rules [00:43:30] framework around this arms control framework. But I want to contextualize that with the unique challenge. So, was I correct when I initially stated that the Chinese are, according to the U.S. military, they perceive the Chinese as the main threat, the main adversary in the 21st century?

**Joan Freese:** Yes, that's correct that the Chinese are perceived as the biggest threat to U.S. space assets.

**Demetri Kofinas:** So, I want to get to this question of how we would create a diplomatic framework [00:44:00] on arms control or what discussions are happening within the diplomatic community on that front. But I think it's important to contextualize that within this larger theoretical game paradigm that many in the military and in Congress and in think tanks in Washington seem to be operating within, what's commonly referred to as the Thucydides Trap and how it specifically relates to China with whom we would need to negotiate any meaningful arms control measures [00:44:30] in the first place.

**Joan Freese:** Well, Thucydides Trap basically looks at the idea of a rising power threatening a power in existence.

**Demetri Kofinas:** Inherently. In other words, just simply- Yeah.

**Joan Freese:** Yes. There will inevitably be conflict with a rising power challenging a sitting power.

**Demetri Kofinas:** And we're the sitting power and China is the rising power.

**Joan Freese:** Right. And Graham Allison, Professor at Harvard University, did a study, I [00:45:00] think it's probably a year or two ago now, looking at has this idea of a Thucydides Trap held true. And he looked at a sample number of conflicts and found that more often than not, it does hold true, that there is conflict that this rising power will eventually either challenge the sitting power, or the sitting power will feel threatened and try to defeat the rising power.

But he also, the study that was done that was [00:45:30] in Atlantic magazine basically said it's not inevitable. But what it takes is a change of perception and attitudes that goes beyond trying to use Band-Aids to cure cancer. China is not going to go away. China is not going to say, "Nevermind, we won't keep pushing development for our 1.3 billion people." It would require [00:46:00] the United States and China to make a new security arrangement, so it's not viewed as rising and sitting power. That it would viewed as how can we both co-exist.

That gets hard politically because for the United States, that would be likely perceived and presented as acquiescence, that we are bowing to the Chinese.

**Demetri Kofinas:** Remarkable. So remarkable. I want to ask you about that. Go ahead, [00:46:30] sorry.

**Joan Freese:** That would be very ... Especially in the current political environment, that won't happen.

**Demetri Kofinas:** That's another problem indeed. You touched on that as well. That's remarkable to me. I understand that for you, it probably isn't because you, again, you've testified before committees. Like I said, I watched one of your testimonies. I used to watch C-SPAN. I used to watch Congressional testimonies quite often on C-SPAN in the past. But the ones that happen in [00:47:00] these more obscure committees are even more remarkable for their variance.

I find this sort of conversation fascinatingly remarkable for two primary reasons. One, when we talk about us, when we talk about the US and we talk about us, I think it's a very limiting term because really who stands to benefit and who stands to lose from these types of escalatory, aggressive postures. One, I endeavor to think that the average person stands to lose a great [00:47:30] deal. And what do we really have to gain from this notion of winning or maintaining empire? It's unclear to me. And also, I don't understand how the press, in particular, because clearly, I can understand a general or a person in the military having a more cynical mindset with respect to war's inevitability and the Thucydides Trap and China.

But the fact that there is this pervasive cynicism around [00:48:00] China from a military standpoint. On the one hand commercially, we have a great relationship with them. Well, it's fraught with issues. There's no question. The recent election brought that up. Trade is an issue. Espionage is an issue. Commercial espionage, IP, those things are all problems. But we've managed to create these interlocking trade and supply chain relationships and

production relationships with the Chinese that have really brought us much closer together. And our world is much more interconnected and our cultures are much more interconnected [00:48:30] than they were before.

But on the government, on the international government military side, there is this seemingly unchanged, if not further calcified, cynicism that pervades the culture with respect to China, and I would say increasingly with respect to Russia. And it's as if we only look at the one side, which is ... And it's also as if we're talking about it as though we're a game. That in fact, there [00:49:00] aren't these devastating consequences to an actual conflict. So much so that we'd be kidding ourselves to suggest that conflict is even an option.

And so that was a bit of a rant. That was me just expressing my opinion on this as someone who is coming to it from the outside. But what is your view on that? What that culture is, how you relate to it in your capacity, testifying and trying to educate people. And I don't know exactly what your opinion is [00:49:30] and how you feel on this.

**Joan Freese:** I think it is in U.S. national interest to have a stable relationship with China. We will agree with them on some things, probably largely related to economics and trade, or at least we have. And we will disagree with them on other things, primarily political and military. But I think the ultimate U.S. goal should be stability. It does nobody any good to have China and the United [00:50:00] States in any kind of military confrontation. Part of the reason, I had very interesting conversations in both United States and in China regarding how we are in this Cold War deadlock still.

And a couple years ago, I was in China and I was having lunch with some young academics from a variety of fields, economics and politics, government. And one of them said to me, he [00:50:30] said, "I just don't understand why the United States has such a hard time working with us." And I said, "Well, with all due respect, the United States has a hard time working with communist authoritarian governments." And they all looked at me and said, "Well, people don't really believe that we're still communist, do they?" And I said, "Oh, very much so. Very, very much so."

To them, to many [00:51:00] of them, communism, it's a single-party authoritarian system. But it's not an ideology. That they are capitalist, it's not ideological any longer. In the United States, if you read testimonies or statements from a lot of our members of Congress who are very adamant about not working with China in space, it includes rhetoric like, "The United States does not work with communist countries. The United States does not work with authoritarian countries." Well, of course we [00:51:30] do when it benefits us.

**Demetri Kofinas:** Well, in fact in the testimony that you gave that I saw, I forget the subcommittee, but in fact one of the Congressman openly laughed and said, "I find it tremendously ironic that a Chinese general was at Davos, a capitalist forum, from a communist country." And I thought, "Clearly, you haven't really been to China recently or not really understand that China is not communist, that they're authoritarian certainly."

**Joan Freese:** And they're a single- [00:52:00] party system and that single party happens to be communist.

**Demetri Kofinas:** Yeah, but they're certainly capitalists.

**Joan Freese:** Yeah. So, there are these real holdover notions. Now, in China, I gave a talk at one point and it was on space. And afterwards, an older man got up, and I don't speak Chinese, but my interpreter basically conveyed that he was pretty much calling me a running dog, a running capitalist [00:52:30] dog.

**Demetri Kofinas:** A running, a running... As opposed to a stationary.

**Joan Freese:** It was right out of central ... He was right out of central casting. But the younger people in the room very carefully came up to me and said, "You just have to wait until it's our turn."

**Demetri Kofinas:** To speak or to rule?

**Joan Freese:** There are these hard positions on both sides. There're hard ideological positions on both sides. There's hard political ... There are those [00:53:00] in the Chinese government and the Chinese military who do not wish the United States well. They see us as keeping them down. And they do not wish us well. Just as that position holds true in the United States regarding the Chinese. There are those in China who want very much to cooperate with the United States. China is no more a monolithic, philosophical, or ideological view than is the United States.

**Demetri Kofinas:** So that, to me, that's an [00:53:30] interesting thing that you touch on. How pervasive is that? And how independent is that of public accountability? In other words, we elect Congressmen, we elect Senators, we elect Presidents. To a certain extent, the government has its own inertia. It has its own momentum. To what extent is that sort of mentality embedded in the departmental and institutional apparatus of the United States government? And how much of that is a [00:54:00] force that we're contending with when we want to try and introduce arms controls and rules of the road, which is something I want to get into in this conversation as well?

**Joan Freese:** Well, bureaucratic politics is a fact of life. The Pentagon is the largest bureaucracy in the United States. And the number one goal of every bureaucracy is self-perpetuation. So, if you have ... If suddenly you were to say, " [00:54:30] The Chinese are not a threat to U.S. space assets," that would make a big drop in the Air Force budget. So, there is a bureaucratic impetus to constantly see a rising threat. Now, that doesn't mean it's not there. It just means that the bureaucracy is going to emphasize threats and de-emphasize opportunities.

**Demetri Kofinas:** Okay. In that case, let's [00:55:00] talk about opportunities. I did want to make sure that we capture the threat and the seriousness of this because it is very serious. And I don't want our audience to glaze over it as I have for so many years without

looking into it in more detail. But let's talk about the ... We talked about the high ground school essentially, folks that see space as this location above the Earth where once you get there, you have control of the domain and etc., etc. [00:55:30] People that see space war as inevitable and therefore, we have to prepare for it.

It seems to me also that that's how John Hyten sees it. I'm not sure if you agree. But just based off of the interviews that he's given, he seems to be in that inevitability camp, which is scary, again, because he's Commander of US Strategic Command. So, there's also the arms control school of thought. I assume that includes people, perhaps that includes yourself, [00:56:00] I'm not sure. These are, again, stereotypes and categories. But that seems to include folks who are basically acknowledging that space war and conflict would be catastrophic. Because again, space wars and space conflict, the use of space conflict in space, that also carries with it the strong likelihood or increased likelihood of nuclear weapons exchange. And that's something that would be catastrophic and devastating here on physical planet Earth.

So, what has [00:56:30] happened so far there in that respect? And I should also mention from what I've been able to find, we have consistently ... I don't remember the name offhand of the UN resolution or the UN agreement that is put forward every year since 1959 or 1957, I'm not sure since when, but we consistently refuse to sign that. So, what can be done? What has been proposed? What is the most logical, reasonable framework that exists that we can think about that the public should be [00:57:00] aware of?

**Joan Freese:** In an idyllic arms control world, you have a treaty, a treaty that would ban space weapons. But again, we've talked about what would that entail. How do you define a space weapon?

**Demetri Kofinas:** Dual use problem.

**Joan Freese:** There's that problem. And then there's the problem of the United States, generally speaking, has not been in the mood to ratify treaties for a very long time. And it's basically because treaties are viewed to [00:57:30] largely restrain the United States because we're already on top. So, if we say, "Okay. Nobody can do any more than the United States has done." Well, that gives a lot of people a lot of room to advance and it holds us treading water. And in fact, I've often asked the question when I have members of Congress ask me, "How are we going to get the Chinese to act as a responsible actor in space?"

And I like to respond by saying, "What would that look like? What does a responsible actor in space look like? [00:58:00] Can we use ourselves as a model? If we are the model for a responsible actor in space, then countries can build missile defense. They can build lots of reconnaissance satellites. They can use all orbit." And the answer is always, "No, no, no. That's not what it means." So basically, the United States has set itself up to have a policy of, "Do as we say, not as we do." And that is simply not sustainable.

So, we're not going to do a treaty. So, what's next? What's the options? Well, there's [00:58:30] something called soft law, which it's kind of not a treaty, but you're working in that direction. And a lot of this has been done through the United Nations where the Chinese and the Russians have proposed every year for several years a treaty to ban weapons in space. But the treaty that they have proposed is quite frankly a self-serving treaty from their perspective, the way it's currently written. And [00:59:00] it is not in the interest of the United States to sign that particular treaty.

I think other countries feel that they can go ahead and sign on because they know the United States is not going to sign on and it's not going to happen. So, they are acting a little self-servingly in that respect as well. But okay, so if you take the treaty off the table, then there are these soft law options. And if you look around for what might we use as a model, well there are rules that are used on the sea, [00:59:30] which is also a global commons, that basically say, "You can't bring your boat any closer to mine than this distance or I can infer nefarious intent. And you have to tell me where you're going." And it's just basically setting up expectations for traffic.

And again, with space becoming more congested, there's the idea that we at least need to have ideas of where people are and what others can expect of them. [01:00:00] That suddenly, if your satellite is approaching mine and you haven't told me about it and you get closer than a certain distance, I can go ahead and defend myself. So, we've been working on this. A few years ago, the Europeans took the initiative to begin pushing international rules of the road. Secretary Clinton got behind it for the United States. The military got behind it because they really have no interest in a Wild West environment.

But [01:00:30] several countries, including China, Russia, Brazil, India, felt that they had not been duly consulted when the original document was drawn up and it was not in their interest. And the Europeans were unable to push it diplomatically and it died.

**Demetri Kofinas:** What year was this? I'm sorry.

**Joan Freese:** It was, I wanna say ... It was Secretary Clinton signed it for the United States.

**Demetri Kofinas:** Like 2009 or 2010 or something.

**Joan Freese:** Yeah. These efforts through the United Nations have come about [01:01:00] where it's basically committees in the United Nations have set up technical councils. So rather than fight your way through the politics, which never works, they set up technical committees to say, "Deal with very specific issues." Because as I said before, you can get the scientists and the engineers to agree on how to safely operate. They have a vested interest in working together. It's just at the political level. So, there's been these [01:01:30] efforts to set up these technical rules of the road, and they divided them into categories of low-hanging fruit, harder, and hardest and made great progress in getting through the first two categories, including with China.

And at the last minute, the Russians tried to blow it up. I personally believe the Russians are far more obstructionists regarding space rules of the road and space methods of conduct [01:02:00] than are the Chinese. But even that has been overcome. And we are showing that progress can be made diplomatically.

But I would also point out that the amount of manpower and money spent on diplomacy through either the State Department or the Defense Department on space is a drop in the bucket compared to what is spent on gee-whiz technology ideas [01:02:30] in the Pentagon.

**Demetri Kofinas:** Am I also correct in having read that ... Are there budget cuts for the State Department? They're in line for budget cuts.

**Joan Freese:** Yes.

**Demetri Kofinas:** Which is a great irony in the context of this conversation. I know you have a hard stop, so I'd like to at least end with getting your summary thoughts and maybe what you'd like to see happening going forward with respect to U.S. policy and the U.S. military's posture in space.

**Joan Freese:** I would like to see [01:03:00] the United States maintain a position of strategic restraint. Because whatever we do, other countries are going to follow. If we develop weapons, overtly develop weapons, other countries will as well. So, if we maintain a position of strategic restraint, where we do the research, we certainly keep pushing with research, we just don't move into a rapid development and deployment phase.

And at the same time, put equal [01:03:30] weight, equal being the keyword there, weight on diplomatic efforts and try to move away from this policy of do as we say, not as we do. Regain a position of leadership where countries want to model us, while keeping that strong, defensive posture. I'm in no way saying this should go away. But don't move into the develop and deploy [01:04:00] technology, which others are going to follow suit on. And at the same time, again, put more, not less effort, into the diplomatic efforts.

**Demetri Kofinas:** And is there some particular ... Is the most promising thing you've seen what the Europeans are doing? I think you said it was the ESA.

**Joan Freese:** What's going on now through two committees at the United Nations is the most promising.

**Demetri Kofinas:** All right. Well, thank you for taking the time to speak with me, Dr. [01:04:30] Freese.

**Joan Freese:** Sure, thank you.

**Demetri Kofinas:** And that was my conversation with Professor Joan Freese. I want to thank the Professor for being on the program. For more episodes, you can check out our

website at [hiddenforces.io](http://hiddenforces.io). Join the conversation on Facebook, Twitter and Instagram @hiddenforcespod. Or send me email. Thanks for listening. We'll see you next week.